

BID DOCUMENTS PROJECT MANUAL

FOR

Greenville YOLO Park Restroom

100 Martin Street
Greenville, Ohio 45331

OWNER

City of Greenville

100 Public Square
Greenville, Ohio 45331

Book 1 of 1



Minster, OH | Columbus, OH | Indianapolis, IN

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22102.00 Greenville YOLO Park

Restroom

Bid Documents

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SECTION 00 11 13 - ADVERTISEMENT FOR BIDS

Sealed proposals will be received by City of Greenville in the, 100 Public Square, Greenville, Ohio 45331, until February 14, 10:00.00 AM, at which time and place proposals will be opened publicly and read aloud. Proposals received after February 14, 10:00.00 AM will be returned unopened. Proposals shall be for the furnishing of materials and the performance of labor necessary for the:

Greenville YOLO Park Restroom
100 Martin St.
Greenville, Ohio, 45331

**All in accordance with the Contract Documents prepared by Garmann/Miller & Associates, Inc.,
Minster, OH | Columbus, OH | Indianapolis, IN**

A Lump Sum bid for the project will be received.

There will be no prebid meeting for this project. Contractors bidding this project are encouraged to visit the site on their own time to be familiar with the site and surrounding area.

A Bid Security in the form of a certified check, cashier's check, irrevocable letter of credit, or surety company bond pursuant to Chapter 1305 of the Ohio Revised code in the amount of 10% of the total bid shall accompany each bid; or a bid guaranty bond in accordance with Chapter 153.571 of the Ohio Revised Code in the amount of 100% of the total bid shall accompany each bid.

The Contract Documents, including Drawings and Specifications, are on file for public inspection at the office of the Architect: Garmann/Miller & Associates Inc., Phone 419-628-4240: the office of the City of Greenville; Construction News Corporation, the McGraw Hill-Dodge Plan Room, the Builders Exchange and iSqFt.

Contract Documents may be purchased from DC Reprographics, 1254 Courtland Ave, Columbus, Ohio 43201; www.DCplanroom.com; Phone 614-297-1200. Each Bidder is responsible for shipping cost or providing a shipping number for billing to the bidders account.

Each bid must be submitted in duplicate on a blank form furnished by the Architect, in a sealed envelope. Mark plainly on the outside of the envelope, the project you are bidding on. No bidder may withdraw their bid for a period of sixty (60) days after the bid opening

The Owner reserves the right to reject any or all bids and to waive informalities, irregularities and/or errors in the bids to the extent permitted by law. This includes the right to extend the date and time for receipt of bids.

This notice is posted on the City of Greenville web site.

Notice can be accessed at: www.cityofgreenville.com.

The Date of this notice: January 18, 2023

By: City of Greenville
100 Public Square
Greenville, Ohio 45331

SECTION 00 11 30 - ABBREVIATED SCOPE OF WORK

THE FOLLOWING IS AN ABBREVIATED SCOPE OF WORK INTENDED TO PROVIDE POTENTIAL BIDDERS WITH INFORMATION AS TO THE SIZE AND NATURE OF THE PROJECT. BIDDERS ARE TO REFER TO THE DRAWINGS AND SPECIFICATIONS FOR THE COMPLETE SCOPE OF WORK.

Project: Greenville YOLO Park Restroom
100 Martin St.
Greenville, Ohio 45331
GM Project Number: 22102
Bid Date: February 14, 10:00.00 AM
Bid Categories: Lump Sum General Contract
Estimate of Construction Cost: \$ 250,000

PROJECT SCOPES OF WORK

General Construction:

Scope includes but is not limited to a restroom building including two group restrooms and a family restroom. Also included is a mechanical room.

Site Work:

Site scope includes but is not limited to grading, underground utilities, concrete pavement, and plantings.

Plumbing Work:

Scope includes but is not limited to connecting to existing water and sanitary piping to provide a working plumbing system to serve two group restrooms and a family restroom. The existing water service currently supplies the splash pad and will remain in place.

HVAC Work:

Scope includes but is not limited to an exhaust fan and a wall louver in each of the three restrooms and an electric cabinet heater in each of the four rooms of the building.

Electrical Work:

Selective demolition of electrical items noted on drawings including but not limited to existing electrical panelboards and receptacles. New work includes but is not limited to: modifying and extending existing electrical service, providing new LED lighting and lighting control, new panelboard, new receptacles and circuitry, and electrical connections to new mechanical and plumbing equipment.

END OF SECTION

AIA® Document A701™ – 2018

Instructions to Bidders

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

Greenville YOLO Park Restroom
100 Martin Street
Greenville, Ohio 45331

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

City of Greenville
100 Public Square
Greenville, Ohio 45331

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

Garmann/Miller & Associates, Inc.
38 S. Lincoln Drive, P.O. Box 71
Minster, Ohio 45865

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ADDITIONS AND DELETIONS:

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

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

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

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

ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

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

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

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

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

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

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

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

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

ARTICLE 2 BIDDER'S REPRESENTATIONS

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

- .1 the Bidder has read and understands the Bidding Documents;
- .2 the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- .3 the Bid complies with the Bidding Documents;
- .4 the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;
- .5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- .6 the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

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

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

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

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

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

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

§ 3.2 Modification or Interpretation of Bidding Documents

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

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

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

§ 3.3 Substitutions

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

§ 3.3.2 Substitution Process

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

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

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

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

§ 3.4 Addenda

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

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

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

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

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

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

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

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

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

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

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

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

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

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

§ 4.2 Bid Security

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

(Insert the form and amount of bid security.)

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount

of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

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

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

§ 4.3 Submission of Bids

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

(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

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

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

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

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

§ 4.4 Modification or Withdrawal of Bid

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

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

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:

(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

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

§ 5.2 Rejection of Bids

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

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

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

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

§ 6.2 Owner's Financial Capability

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

§ 6.3 Submittals

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

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

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

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

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

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

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

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

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

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

§ 7.2 Time of Delivery and Form of Bonds

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

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

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.
(Insert the complete AIA Document number, including year, and Document title.)
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013.)

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda:

Number	Date	Pages

.8 Other Exhibits:

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

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

☐ The Sustainability Plan:

Title	Date	Pages

☐ Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents listed below:

(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

SECTION 00 22 13 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

MODIFICATIONS TO AIA A701

Article 3 Bidding Documents

3.1 Copies

Change Paragraph 3.1.2 as follows

Bidding documents will be issued directly to sub-bidders as offered in the Notice to Bidders.

3.2 Interpretation or Correction of Bidding Documents

Add Paragraph 3.2.1.1 as follows

3.2.1.1 Each Bidder is responsible for calling to the attention of the Architect any ambiguities, inconsistencies, errors, or omissions which may occur in the documents for their part of the Work. If Bidder fails to request clarification, the bidder will be expected to overcome such conditions without additions to the bid amount.

Add Paragraph 3.2.2.1 as follows

3.2.2.1 Clarification or interpretation can be made via telephone, 419-628-4240 or email to Ryan Heitkamp; rheitkamp@creategm.com

3.4 Addenda

Delete paragraph 3.4.3 and substitute the following

3.4.3 If an addendum is issued within 72 hours prior to the published time for the opening of bids (excluding Saturdays, Sundays, and legal holidays), the time for opening of bids shall be extended one (1) week with no further advertising required.

Article 4 Bidding Procedures

4.1 Preparation of Bids

Add Paragraph 4.1.1.1

Any substantial change, alteration or wording of the bid form may cause a bid to be rejected as not responsive.

Change Paragraph 4.1.3 as follows

4.1.3 Sum shall be expressed in both words and figures and in figures only where no space is provided for words. In case of discrepancy, the amount written in words shall govern.

Add paragraph 4.1.5.1 and 4.1.5.2 as follows

4.1.5.1 A blank entry or an entry of "No Bid", "N/A" or similar entry on any alternative will cause a bid to be rejected as non responsive if that alternate is selected.

4.1.5.2 If an alternative is not selected and an entry of "No Bid", "N/A" or similar entry for the alternative is listed, this action, by itself, will not render the bid as non responsive.

Add Paragraph 4.1.8 as follows

4.1.8 The bidder shall include a signed copy of the Non-Collusion Affidavit and Contractor's Affidavit with their bid, a copy is included in the Project Manual.

4.2 Bid Security

Delete paragraphs 4.2.1, 4.2.2 and 4.2.3 and substitute the following:

4.2.1 Each bid will be accompanied by a bid security in accordance with Section 153.54 (B), Ohio Revised Code, in the amount of the base bid plus add alternates or:

4.2.2 A signed bond in the form of a certified check, cashier's check or letter of credit, as provided in Section 153.54 (c), ORC. The amount of the certified check, cashier's check or letter of credit shall be equal to ten (10) percent of the base bid plus add alternates or:

4.2.3 Bid guaranty and contract bond in accordance with Chapter 153.571 of the ORC in the amount of 100 percent of the total base bid plus add alternates. If the dollar space on the bid guaranty is left blank, the penal sum will be the full amount of the base

bid plus add alternates, stated in dollars and cents. A percentage is not acceptable, pursuant to Section 153.571, ORC.

4.2.4 The bond shall serve as an assurance that the bidder will, upon acceptance of the bid, comply with all conditions precedent for contract execution, within the time specified.

4.2.5 The bond must be issued by a surety authorized by the Department of Insurance to transact business in Ohio. The bond must be issued by a surety capable of demonstrating a record of competent underwriting, efficient management, adequate reserves, and sound investments. These criteria will be met if the surety currently has an A.M. Best Company Policy Holders Rating of "A+", "A" or "A-" or better and has or exceeds the Best Financial Size Category of Class VII. The bond must be signed by an authorized agent, with Power of Attorney, from a surety.

4.2.6 Bond will be returned to all unsuccessful bidders after contract is awarded. If used, a certified check, cashier's check or letter of credit will be returned to the successful bidder upon providing the bond required by Section 153.54 (c), ORC.

4.2.7 If for any reason, other than as authorized by Article 4.4, Modifications or Withdrawal of Bid, the bidder fails to enter into a contract, and the owner awards the contract to the next lowest responsive and responsible bidder, the bidder who failed to enter into a contract shall be liable to the owner for the difference between the bidder's bid and the bid of the next lowest responsive and responsible bidder, or for a penal sum not to exceed ten (10) percent of the bid amount, whichever is less, pursuant to Section 153.54 ORC.

4.3 Submission of Bids

Add Paragraph 4.3.1.1 as follows

4.3.1.1 Submit bid(s) in duplicate.

4.4 Modification or Withdrawal of Bid

Add the following to Article 4.4:

4.4.5 All bids are valid for (60) days after the opening of bids. A bid may be extended thereafter upon mutual agreement, in writing, between the owner and contractor.

Awards beyond the sixty (60) day period shall be reviewed for increased cost of the contract only if the cause for delay is no fault of the contractor and substantiated.

4.4.6 A bidder may withdraw a bid from consideration after the bid opening if the bid amount was substantially lower than the amounts of other bids, providing the bid was submitted in good faith, and the reason for the bid amount being substantially lower was a clerical mistake as opposed to a judgement mistake, and was actually due to an unintentional and substantial arithmetic error or an unintentional omission of a substantial quantity of work, labor or material made directly in the compilation of the bid amount. Request to withdrawal bid must be made in writing filed with the owner and architect within two business days after conclusion of the bid opening.

Article 5 Consideration of Bids

5.2 Rejection of Bids

Add paragraphs 5.2.2, 5.2.3 and 5.2.4 as follows

5.2.2 If the lowest Bidder is not responsive or responsible, the Owner shall reject such bid and shall notify the Bidder the reasons for the finding.

5.2.3 A Bidder notified that he is not responsive or responsible may object to the Owner's decision by filing a written request for reconsideration, which must be received by the Owner within five (5) days of the date of the notice from the Owner.

5.2.4 Upon receipt of a timely request, the Owner shall meet with the Bidder to listen to the Bidder's objections.

a) No award of contract shall become final until the Owner has met with all Bidders who have filed timely request for reconsideration.

- b) If all request for reconsideration are rejected in the Owner's discretion, the award of contract shall become final, or the Owner, in its discretion, may reject all bids.
- c) If a request for reconsideration is not rejected, any procedures for the determination of the lowest responsible Bidder that have not already been completed concerning the applicable Bidder shall be completed. Following the completed procedures and evaluation of the Bidder, the Bidder will be notified of the findings.

5.3 Acceptance of Bid (Award)

Add paragraphs 5.3.1.1, 5.3.1.2 and 5.3.1.3

5.3.1.1 Pursuant to Section 153.08, ORC, the contract will be awarded to the lowest responsive and responsible bidder.

5.3.1.2 In determining the lowest Bidder, the owner shall consider the base bid and any selected alternates which the owner determines to accept. The Owner shall have the right to select alternatives in any combinations. The lowest bidder will be based on the lowest base bid plus selected alternates, and may result in an award to a Bidder other than the Bidder that submitted the lowest base bid. Voluntary alternatives will not be considered in determining the lowest amount.

5.3.1.3 The Bidder acknowledges that although there is an estimate for the cost of the Project, the market conditions may and frequently do result in the estimate being different from the sum of the bids received, either higher or lower. The Bidder understands that the Owner has included alternatives, which include deduct and add alternates, to give flexibility in building the Project with funds available. The Bidder further understands and acknowledges that the use of add and deduct alternates is a long held customary practice in the construction industry in the State of Ohio. The Bidder also acknowledges that the Owner will not make a decision about what alternates on which to base the award of contracts until the bids are received, and the Owner can compare its available funds with the base bids and the cost or savings from selecting different alternatives.

Delete paragraph 5.3.2 and substitute the following

5.3.2 Subject to the right of the owner to reject each and every bid, the owner will determine the lowest responsive bid by taking into consideration not only the amount of the bid but such of the following criteria as it, in its discretion, deems appropriate and may give such weight thereto as it deems appropriate in determining the responsibility of the bidder:

The bidder's financial ability to complete the contract.

The bidder's experience with projects of similar size and scope and more complex projects.

The conduct and performance of the bidder on previous contracts completed in a timely manner.

The bidders facilities and equipment.

The adequacy, in numbers and experience, of the bidders work force to complete the contract successfully on time and on budget.

The ability of the bidder to execute the contract properly.

The evaluation of the bid substantially below the median of other bids.

Add paragraphs 5.3.3, 5.3.4 and 5.3.5

5.3.3 The Owner shall obtain from the lowest Bidder any information the owner deems appropriate to the consideration of factors showing responsibility. The failure to submit requested information on a timely basis may result in the determination that the bidder is not responsible.

5.3.4 The Bidder authorizes the Owner and its representatives to contact owners, construction managers, contractors, and design professionals on projects on which the Bidder has worked and authorizes and requests such owners,

construction managers, contractors, and design professionals to provide a candid evaluation of Bidder's performance. By submitting a bid, the Bidder agrees that if he or any person at his urging, directly or indirectly, brings action against any of such owners, construction managers, contractors, and design professionals or their employees as a result of or related to such candid elevation and such action is not successful, the Bidder will reimburse such owners, design professionals and/or their employees for all legal fees and expenses incurred by them that are related to such legal action, including the cost of collection. This obligation is expressly intended for the benefit of such owners, construction managers, contractors, design professionals and their employees.

5.3.5 The number of consecutive calendar days required to complete the work shall be considered by the owner in determining the lowest and responsive bidder.

Article 7 Performance Bond and Payment Bond

7.1 Bond Requirements

Delete paragraphs 7.1.1, 7.1.2, 7.1.3 and substitute the following:

7.1.1 The bidder shall furnish bonds covering the faithful performance of the contract and payment of all obligations arising thereunder.

7.1.2 Prior to award of contract, successful bidders who provided a cashier's check, certified check or letter of credit as bid security shall submit a contract bond in the form of a performance and payment bond in an amount equal to 100% of the contract sum. The performance and payment bond must be signed by an authorized agent of an acceptable surety bonding company and by the bidder. Bond must be issued by a surety company authorized by Ohio Department of Insurance to transact business in the State of Ohio. The bond shall be issued by a surety company which can adequately demonstrate a record of competent underwriting, efficient management, adequate reserves and soundness of investments. These criteria will be met if the surety currently has an A.M. Best Company Policyholder Rating of "A+", "A", or "A-" or better and has or exceeds the Best Financial Size Category of Class VII.

7.1.4 Bond must be countersigned by an Ohio resident agent if bond is issued by an out-of-state agent.

7.1.5 Performance and payment bond must be supported by credentials showing power of attorney and corporate seals to each copy.

Bonds shall remain in effect for 12 months after date of substantial completion is issued by the owner. Certificate by bonding company of compliance is required prior to final acceptance of project.

END OF SECTION

**SECTION 00 31 19
EXISTING CONDITION INFORMATION**

PART 1 GENERAL

1.01 EXISTING CONDITIONS

- A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:
- B. Site and Utility Survey: Entitled Site Survey, dated January 12, 2023.
 - 1. Original copy is available for inspection at Owner's offices during normal business hours.
 - 2. This survey identifies grade elevations prepared primarily for the use of Architect in establishing new grades and identifying natural water shed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

COVENANT B OF THE JANUARY 27, 1972
EQUAL EMPLOYMENT OPPORTUNITY EXECUTIVE ORDER
OF THE GOVERNOR OF OHIO

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, ancestry, or sex. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race color, religion, national origin, ancestry, or sex. Such action shall include, but is not limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; lay-off or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeships. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided, setting forth the provisions of this nondiscrimination clause.
2. The contractor will in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, ancestry, or sex.
3. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided by the State Administering Agency, advising the said labor union or workers' representatives of the contractor's commitments under this covenant and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The contractor will comply with all provisions of the Department of Administrative Services, Division of Public Works (DPW) Regulation on Equal Employment Opportunity (EEO) and with the implementing rules, regulations, and applicable orders of the State Equal Employment Opportunity Coordinator.
5. The contractor agrees he will fully cooperate with the State Administering Agency, the State Equal Employment Opportunity Coordinator, and with any other official or agency of the state or federal government that seeks to eliminate unlawful employment discrimination, and with all other state and federal efforts to assure equal employment practices under this contract. Said contractor shall comply promptly with all requests and directions from the State Administering Agency, the State Equal Employment Opportunity Coordinator, and any of the State of Ohio's officials and agencies in this regard, both before and during construction.
6. Full cooperation as expressed in clause 5 above, shall include, but not be listed to, being a witness and permitting employees to be witnesses and complainants in any proceeding involving questions or unlawful employment practices, furnishing all information and reports required by the DPW Regulation on EEO and by the rules, regulations, and orders of the State Equal Employment Opportunity Coordinator pursuant thereto, and permitting access to his books, records, and accounts by the State Administering Agency and the State Equal Employment Opportunity Coordinator for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
7. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further state contracts or state assisted construction contracts in accordance with procedures authorized in the DPW Regulations on EEO, and such other sanctions may be instituted and remedies invoked as provided in said Regulation or by rule, regulation, or order of the State Equal Employment Opportunity Coordinator, or as otherwise provided by law.

In the event this contract is terminated for a material breach of said Regulations, the contractor shall become liable for any and all damages as a result of said breach.

8. The contractor will include the portion of the sentence immediately preceding Paragraph 1 and the provisions of Paragraphs 1 through 8 in every subcontract or purchase order unless exempted by rules, regulations, or orders of the State Equal Employment Opportunity Coordinator issued pursuant to Section 204 of the DPW Regulation on EEO, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the State Administering Agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event the contractor becomes involved in, or is threatened with litigation with a subcontractor, vendor or other party as a result of such direction by the State Administering Agency, the contractor may request the State of Ohio to enter into such litigation to protect the interests of the State.

NOTICE: THE CONTRACTOR MUST COMPLY WITH THE PROVISIONS OF THE GOVERNORS EXECUTIVE ORDER 84-9, DATED FEBRUARY 15, 1984, WHICH REQUIRES THE ESTABLISHMENT OF UNIFORM STATEWIDE GOALS FOR THE UTILIZATION OF WOMEN ON STATE AND STATE-ASSISTED CONSTRUCTION CONTRACTS.

TITLE 18, U.S.C. , SECTION 874

KICKBACKS FROM PUBLIC WORKS EMPLOYEES

Whoever, by force, intimidation, or threat of procuring dismissal from employment, or by any other manner whatsoever induces any person employed in the construction, prosecution, completion or repair of any public building, public work, or building or work financed in whole or in part by loans or grants from the United States, to give up any part of the compensation to which he is entitled under his contract of employment, shall be fined not more than \$10,000 or imprisoned not more than five years, or both.

CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

The contractor agrees to comply with federal clean air and water standards during the performance of this contract and specifically agrees to do the following:

- a. The term "facility" means (a) any building, plant, installation, structure, mine, vessel or other floating craft, location or site of operations (b) owned, leased or supervised (c) by the contractor and subcontractor (d) for the construction, supply and service contracts entered into by the contractor;
- b. That any facility to be utilized in the accomplishment of this contract becomes listed on the EPA list, this contract may be canceled, terminated or suspended in whole or in part;
- c. That in the event a facility utilized in the accomplishment of this contract becomes listed on the EPA list, this contract may be canceled, terminated or suspended in whole or in part;
- d. That it will comply with all the requirements of Section 114 of the Air Act and Section 308 of the Water Act relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified in Section 114 and Section 308, respectively, and all regulations and guidelines issued thereunder;
- e. That it will promptly notify the government of the receipt of any notice from the Director, Office of Federal Activities, Environmental Protection Agency, indicating that any facility utilized or to be utilized in the accomplishment of this contract is under consideration for listing on the EPA List of Violating Facilities;
- f. That it will include the provisions of paragraphs "a" through "g" in every subcontract or purchase order entered into for the purpose of accomplishing this contract, unless otherwise exempted pursuant to the EPA regulations implementing the Air or Water Act (40 CFR, Part 15.5), so that such provisions will be binding upon each subcontractor or vendor;
- g. That in the event that the contractor or the subcontractors for the construction, supply and service contracts entered into for the purpose of accomplishing this contract were exempted from complying with the above requirements under the provisions of 40 CFR, Part 15.5(a), the exemption shall be nullified should the facility give rise to a criminal conviction (See 40 CFR, part 15.20) during the accomplishment of this contract. Furthermore, with the nullification of the exemption, the above requirements shall be effective. The contractor shall notify the government, as soon as the contractor's or the subcontractors' facility is listed for having given rise to a criminal conviction noted in 40 CFR, Part 15.20.

SECTION 00 41 13 - BID FORM
THE PROJECT AND THE PARTIES

TO:

City of Greenville
100 Public Square
Greenville, Ohio 45331

FOR:

Project: Greenville YOLO Park Restroom
Project Number: 22102
100 Martin St.
Greenville, Ohio 45331

DATE: _____ (Bidder to enter date)

SUBMITTED BY:

Bidder's Full Name: _____

Address: _____

City, State, Zip: _____

Telephone: _____

Fax No.: _____

E-mail: _____

OFFER

Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Garmann/Miller & Associates Inc. for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Sum of:

Item 1 - Contract A, General Construction - Base Bid:

_____ dollars

All Cash and Contingency Allowances described in Section 01 2100 are included in the Bid Sum.

Item 1a - Alternate 01 - Alternate completion date of May 26, 2023:

If Alternate 01 is accepted, add:

_____ dollars

We have included the Bid Bond or security deposit as required by the Advertisement, Notice to Bidders, Instructions to Bidders.

This is a Tax Exempt Project.

Builders Risk Insurance is to be furnished by the Owner.

State of Ohio Prevailing Wage Rates, have been included.

ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for sixty days from the bid closing date.

If this bid is accepted by City of Greenville within the time period stated above, we will:

Execute the Agreement within ten (10) days of receipt of Notice of Award.

Commence work within ten (10) days after written Notice to Proceed of this bid.

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 City of Greenville 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.

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.

CONTRACT TIME

Owners desired start date: February 20, 2023

Owners desired completion date: June 30, 2023

If this Bid is accepted, we will:

Complete the Work by Date or at an earlier date of _____ (Bidder to enter completion date or time frame prior to completion date listed.)

ADDENDA

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.

Addendum # _____ Dated _____.

Addendum # _____ Dated _____.

Addendum # _____ Dated _____.

Addendum # _____ Dated _____.

BID FORM SUPPLEMENTS

Bid Bond

Noncollusion Affidavit

Contractor's Affidavit

BID FORM SIGNATURE(S)

(Bidder - print the full name of your firm)

was hereunto affixed in the presence of:

(Authorized signing officer)

(Authorized signing officer, Title)

SEALED SUBMISSION:

Bid is to be submitted in Duplicate.

Bid is to be submitted in a sealed envelope containing bid and bid form supplements and addressed as follows:

Prime Contract Bid for:
Greenville YOLO Park Restroom
100 Martin St.
Greenville, Ohio 45331

END OF BID FORM

SECTION 00 45 19 - NON-COLLUSION AFFIDAVIT

STATE OF _____

BID Identification _____

CONTRACTOR _____

_____, being
first duly sworn, deposes and says that they are _____ (sole owner, a partner,
president, secretary, etc.) of

_____, the party making
the foregoing BID; that such BID is not made in the interest of or on behalf of any undisclosed
person, partnership, company, association, organization, or corporation; that such BID is genuine
and not collusive or sham: that said BIDDER to put in a false or sham BID, and has not directly or
indirectly colluded, conspired, connived, or agreed with any BIDDER or any one else to put in a
sham BID, or that any one shall refrain from bidding; that said BIDDER has not in any manner,
directly or indirectly, sought by agreement, communication or conference with any one to fix the
BID price of said BIDDER or of any other BIDDER, or to fix any overhead, profit, or cost element of
such BID price, or of that of any other BIDDER, or to secure any advantage against the OWNER
awarding the contract or anyone interested in the proposed contract; that all statements contained
in such BID are true; and, further, that said BIDDER has not, directly or indirectly, submitted his BID
price or any breakdown thereof, or the contents thereof, or divulged information or data relative
thereto, or paid and will not pay any fee in connection therewith, to any corporation, partnership,
company, association, organization, BID depository, or to any member or agent thereof, or to any
other individual except to such person or persons as have a partnership or other financial interest
with said BIDDER in his general business.

Signed:

(Bidder - print the full name of your firm)
was hereunto affixed in the presence of:

(Authorized signing officer)

(Authorized signing officer, Title)

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

Seal of Notary

SECTION 00 45 21 - CONTRACTOR'S AFFIDAVIT

State of Ohio

County of _____, ss:

_____ (Name) being first duly sworn, deposes and says that he/she is

the _____ (Title) of _____ (Name of Contractor)

with offices located at _____ (Address of Contractor),

and its duly authorized representative, states that effective

the ____ day of _____ 20__, (date of submission of bid)

_____ (Name of Contractor):

() is charged with delinquent personal property taxes on the general list of personal property as set forth below:

County	Amount (include total amount, penalties and interest)
	\$
	\$
	\$
	\$

() is not charged with delinquent personal property taxes on the general list of personal property in any Ohio county

_____ (Affiant)

Subscribed and sworn to before me this ____ day of _____, 20__.

Seal of Notary

**SECTION 00 50 00
CONTRACTING FORMS AND SUPPLEMENTS**

PART 1 GENERAL

**1.01 CONTRACTOR IS RESPONSIBLE FOR OBTAINING A VALID LICENSE TO USE ALL
COPYRIGHTED DOCUMENTS SPECIFIED BUT NOT INCLUDED IN THE PROJECT MANUAL.**

1.02 AGREEMENT AND CONDITIONS OF THE CONTRACT

- A. See Section 00 73 00 - SUPPLEMENTARY CONDITIONS for the Supplementary Conditions.
- B. The Agreement is based on AIA A101.
- C. The General Conditions are based on AIA A201.

1.03 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in Contract Documents.
- B. Bond Forms:
 - 1. Performance and Payment Bond Form: In Compliance with the Ohio Revised Code.
- C. Non-Collusion Affidavit: 00 45 19 Non-Collusion Affidavit
- D. Contractor's Affidavit: 00 45 21 Contractor's Affidavit
- E. Post-Award Certificates and Other Forms:
 - 1. Contracting Submittal Letter Form: 01 33 23 Contractor Submittal Form.
 - 2. Application for Payment Forms: AIA G702 with AIA G703 (for Contractors).
- F. Clarification and Modification Forms:
 - 1. Request for Interpretation Form: Garmann/Miller Architect and Engineers, Request for Information Form attached following this section.
 - 2. Architect's Supplemental Instructions Form: AIA G710.
 - 3. Construction Change Directive Form: AIA G714.
 - 4. Request for Proposal Form: AIA G709.
 - 5. Change Order Form: AIA G701.
- G. Closeout Forms:
 - 1. Certificate of Substantial Completion Form: AIA G704.
 - 2. Conditional Lien Waiver and Release Upon Progress Payment form: Section 00 61 16.

1.04 REFERENCE STANDARDS

- A. AIA A101 - Standard Form of Agreement Between Owner and Contractor where the basis of Payment is a Stipulated Sum 2007.
- B. AIA A201 - General Conditions of the Contract for Construction 2007.
- C. AIA G701 - Change Order 2001.
- D. AIA G702 - Application and Certificate for Payment 1992.
- E. AIA G703 - Continuation Sheet 1992.
- F. AIA G704 - Certificate of Substantial Completion 2000.
- G. AIA G710 - Architect's Supplemental Instructions 1992.
- H. AIA G714 - Construction Change Directive 2007.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

DRAFT AIA® Document A101® – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

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

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

«City of Greenville»« »
«100 Public Square
Greenville, Ohio 45331 »
« »
« »

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

« »« »
« »
« »
« »

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

«Greenville YOLO Park Restroom»
«100 Martin Street
Greenville, Ohio 45331»
« »

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

«Garmann/Miller & Associates, Inc.»« »
«38 S. Lincoln Drive, P.O. Box 71
Minster, Ohio 45865»
« »
« »

The Owner and Contractor agree as follows.

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

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

The parties should complete A101®-2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®-2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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

TABLE OF ARTICLES

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

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

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

(Check one of the following boxes.)

☐ The date of this Agreement.

☐ A date set forth in a notice to proceed issued by the Owner.

☐ Established as follows:

(Insert a date or a means to determine the date of commencement of the Work.)

☐

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

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

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

[« »] Not later than « » (« ») calendar days from the date of commencement of the Work.

[« »] By the following date: « »

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date
« »	

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

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » (\$ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

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

Item	Price
« »	

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance
« »		

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

Item	Price
« »	

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

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

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

« »

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

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.

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

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

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

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

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

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

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

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201-2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201-2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

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

« »

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

« »

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

« »

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

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

§ 5.2 Final Payment

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

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

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

« »

§ 5.3 Interest

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

(Insert rate of interest agreed upon, if any.)

« » % « »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »

« »

« »

« »

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

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

[☐] Litigation in a court of competent jurisdiction

[☐] Other *(Specify)*

« »

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

ARTICLE 7 TERMINATION OR SUSPENSION

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

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

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

« »

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

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:

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

« »

« »

« »

« »

« »

« »

§ 8.3 The Contractor's representative:

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

« »

« »

« »

« »

« »

« »

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

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

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

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 8.7 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

« »

.5 Drawings

Number	Title	Date
« »		

.6 Specifications

Section	Title	Date	Pages
« »			

.7 Addenda, if any:

Number	Date	Pages
« »		

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

.8 Other Exhibits:

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

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages
« »		

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
« »			

.9 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™-2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

« »

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

« »

OWNER (Signature)

« »« »

(Printed name and title)

« »

CONTRACTOR (Signature)

« »« »

(Printed name and title)

SECTION 00 61 16 - CONDITIONAL LIEN WAIVER AND RELEASE UPON PROGRESS PAYMENT

Known by all those present:

Upon receipt by the undersigned of a check from the Contractor in the amount of:

\$ _____

Payable to: _____,

and when the check has been properly endorsed and had been paid by the bank upon which it is drawn, document becomes effective to release and satisfy all lien rights, claims, or demands of any kind whatsoever.

Which the undersigned now has against, City of Greenville, its successors and assigns on the job site located at: 100 Martin St., Greenville, Ohio 45331.

This release covers a progress payment for labor, material, and equipment furnished on the Greenville YOLO Park Restroom.

This release is valid through _____ (date of submittal) and does not cover retainage.

The undersigned warrants that they either have already paid or will use the monies they receive from the progress payment, to promptly pay in full for all of the labor, subcontractors, and suppliers for all their work, material, equipment or services provided for or to the: Greenville YOLO Park Restroom, up to the date of this waiver.

Date: _____

Company: _____

Signature: _____

By (name & title): _____

**Sworn before me in the State of Ohio, in the County of _____,
subscribed and sworn before me this _____ Day of _____, 20_____.**

Notary Republic Signature: _____

Notary Republic Name: _____

My commission expires on: _____

(seal & stamp)

END OF SECTION



Request for Information

FORM 00 63 13

Project name _____
Project location _____
Contractor _____
A/E contact _____

RFI no. _____

GM project no. _____
Drawing sheet no. _____
Specification section _____
Date answer requested _____

Description of interpretation or clarification needed

Date received _____

Name _____ Phone number _____
Signature _____ Date released _____

A/E Response

Date received _____

Name _____ Phone number _____
Signature _____ Date released _____

Contractor receipt

Upon review of the A/E's response we anticipate the potential contract adjustments indicated to the right:

Date in _____ Date out _____

Name _____

Signature _____ Date _____

- ☐ No change in cost or time
- ☐ Decrease in cost of approx. \$ _____
- ☐ Increase in cost of approx. \$ _____
- ☐ Decrease in time of _____ days
- ☐ Increase in time of _____ days

AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

Greenville YOLO Park Restroom
100 Martin Street
Greenville, Ohio 45331

THE OWNER:

(Name, legal status and address)

City of Greenville
100 Public Square
Greenville, Ohio 45331

THE ARCHITECT:

(Name, legal status and address)

Garmann/Miller & Associates, Inc.
38 S. Lincoln Drive, P.O. Box 71
Minster, Ohio 45865

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- 13 MISCELLANEOUS PROVISIONS
- 14 TERMINATION OR SUSPENSION OF THE CONTRACT

ADDITIONS AND DELETIONS:

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

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

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

Init.

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15 CLAIMS AND DISPUTES



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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

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

§ 1.1.2 The Contract

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

§ 1.1.3 The Work

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

§ 1.1.4 The Project

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

§ 1.1.5 The Drawings

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

§ 1.1.6 The Specifications

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

§ 1.1.7 Instruments of Service

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

§ 1.1.8 Initial Decision Maker

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

§ 1.2 Correlation and Intent of the Contract Documents

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

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

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

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

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

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

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

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

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

§ 1.8 Building Information Models Use and Reliance

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

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements,

assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

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

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

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

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

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

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

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

ARTICLE 3 CONTRACTOR

§ 3.1 General

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

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

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

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

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

§ 3.3 Supervision and Construction Procedures

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

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

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

§ 3.4 Labor and Materials

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

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

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

§ 3.5 Warranty

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

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

§ 3.6 Taxes

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

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

§ 3.7.4 Concealed or Unknown Conditions

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

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

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 Superintendent

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

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

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

§ 3.10 Contractor's Construction and Submittal Schedules

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

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

Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

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

§ 3.11 Documents and Samples at the Site

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

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

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

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

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18 Indemnification

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

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

ARTICLE 4 ARCHITECT

§ 4.1 General

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

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

§ 4.2 Administration of the Contract

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

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

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the

Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

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

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

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

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

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

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

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

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

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations

and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

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

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

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

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

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

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

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

§ 5.3 Subcontractual Relations

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

prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

§ 6.2 Mutual Responsibility

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work,

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

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

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

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 Change Orders

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

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

§ 7.3 Construction Change Directives

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

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

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

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

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

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

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

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

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

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

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

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

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will

affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

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

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

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

§ 8.3 Delays and Extensions of Time

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

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

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

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

§ 9.2 Schedule of Values

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

unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

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

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

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

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

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

§ 9.4 Certificates for Payment

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

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

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

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

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

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

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

§ 9.6 Progress Payments

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

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

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

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

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

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

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

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

§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

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

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

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

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

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

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

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

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

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

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

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

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

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

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

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

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

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

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

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

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

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

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

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

§ 11.2 Owner's Insurance

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

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

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

§ 11.3 Waivers of Subrogation

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

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

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

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

§ 11.5 Adjustment and Settlement of Insured Loss

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to

the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

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

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

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

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

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

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

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

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

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

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

§ 13.5 Interest

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

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

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

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

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

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

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

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

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

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

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

§ 14.3 Suspension by the Owner for Convenience

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

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

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

§ 14.4 Termination by the Owner for Convenience

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

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

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

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

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

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

§ 15.1.2 Time Limits on Claims

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

§ 15.1.3 Notice of Claims

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

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

§ 15.1.4 Continuing Contract Performance

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

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

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

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

§ 15.1.7 Waiver of Claims for Consequential Damages

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

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

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

§ 15.2 Initial Decision

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

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

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

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

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

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

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

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

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

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

§ 15.3 Mediation

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

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

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

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

§ 15.4 Arbitration

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

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

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

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

§ 15.4.4 Consolidation or Joinder

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

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

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

SECTION 00 73 00 - SUPPLEMENTARY CONDITIONS

MODIFICATIONS TO AIA

These Supplementary Conditions amend or supplement the General conditions of the Contract for Construction (AIA Document A201, 2017 edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemental remain in full force and effect.

The terms used in these Supplementary Conditions which are defined in the General Conditions of the Contract of Construction (AIA Document A201, 2017 Edition) have the meanings assigned to them in the General Conditions.

ARTICLE 1 - GENERAL PROVISIONS

Paragraph 1.1 Basic Definitions: Add the following paragraphs

1.1.9 Furnish: The term 'furnish' shall mean to purchase and deliver product to the site ready for installation.

1.1.10 Install: The term 'install' shall mean to take furnished product and assemble, erect, secure in place, connect in operation as applicable.

1.1.11 Provide: The term 'provide' shall mean to furnish and install.

Paragraph 1.2 Correlation and Intent of the Contract Documents:

Add the following paragraph 1.2.1.1

1.2.1.1 In the event of inconsistencies within or between the Contract Documents, the Contractor shall provide the better quality or greater quantity of Work and shall comply with the stricter requirements.

ARTICLE 2 - OWNER

Paragraph 2.1.2.1; Add the following:

The Owner shall prepare a Notice of Commencement for the Project as required by the Ohio Revised Code and provide a copy to the Contractor.

Add paragraph 2.1.3

2.1.3 The Owner shall mean:

City of Greenville
100 Public Square
Greenville, Ohio 45331

Paragraph 2.3.4: Modify to read

2.3.4 The owner shall not be responsible for furnishing surveys or other information as to the physical characteristics, legal limitations, or utility locations for the Project site, except as included in the Contract Documents. The Contractor shall confirm the location of each utility.

ARTICLE 3 - CONTRACTOR

Article 3.2 Review of Contract Documents and Field Conditions by Contractor.

Add the following paragraph 3.2.2.1

3.2.2.1 If the contractor finds any perceived conflict, error, omission or discrepancy on, or between the drawings, specifications, or any of the contract documents, the contractors, before proceeding with the work, shall submit a request to the architect for an interpretation or clarification, the contractor shall be responsible for the prompt delivery of such request.

The architect shall respond to the requests for interpretation of the contract documents within three (3) business days.

3.2.2.2 Any interpretation of the Contract Documents made by any party other than the architect or in any manner other than writing, shall not be binding and the contractor shall not rely upon any such interpretation.

Article 3.4 Labor and Material

Paragraph 3.4.2 add the following at the end of the paragraph:

See Substitution Procedures in Section 01 6000 - Product Requirements for additional requirements.

Article 3.5 Warranty

Add the following to paragraph 3.5.1

The contractor shall warranty and guarantee that all work is in conformity with the Contract Documents and free from defects in workmanship, materials and equipment for a period of one (1) year in addition to other warranties and guarantees specified in the Contract Documents. The performance bond will remain in effect during the warranty period

The warranty and guarantee time period shall commence on the date that the Certificate of Substantial Completion is issued by the architect unless otherwise provided in writing.

The warranty and guarantee provided in this article shall be in addition to and not limitation of any other warranty and guarantee or remedy provided by law or by the Contract Documents.

Should defects in the work become apparent within the warranty and guarantee period, the owner shall promptly notify the contractor in writing and provide a copy of the notice to the architect. Within ten (10) days of receipt of the notice, the contractor shall visit the project in the company of the owner to determine the extent of the defects and shall promptly repair or replace the defective work, including adjacent work damaged as a result of such defects and as a result of remedying the defects whether or not such adjacent work was originally provided by the contractor. The contractor shall be responsible for the cost of temporary materials or equipment required during the repair or replacement of the defective work.

If the defective work is considered by the Owner to be an emergency, the owner may require the contractor to visit the project within one (1) day of receipt of the notice.

Work which is repaired or replaced by the contractor shall be inspected and accepted by the Owner. The repaired and replaced work shall be guaranteed by the contractor for one (1) year from the date of acceptance by the owner.

Article 3.6 Taxes

Add the following:

The Contractor acknowledges that the Owner is a political subdivision of the State of Ohio or tax exempt organization and is exempt from state sales, use and commercial activity taxes. Upon written request, the Owner will provide the Contractor with an applicable certificate of exemption.

Article 3.7 Permits, Fees and Notices

Omit paragraph 3.7.1 and add the following:

3.7.1 The Owner shall secure and pay for the Certificate of Plan Approval and Plumbing Approval as required by the Ohio Basic Building Code. The owner will pay for the sprinkler and fire alarm fees as required by the Ohio Basic Building Code with the sprinkler contractor and the fire alarm contractor submitting drawings and calculations required (seven sets minimum) to the architect. The contractor shall secure and pay for all other building permits, tap fees, user fees, and governmental fees, licenses and inspections. The contractor is to verify the exact cost of permits, fees, licenses and inspections. No additional cost or change orders will be permitted because of causal or approximated fees or escalation of fees occurring after award of contract.

Article 3.11 Documents and Samples at the Site

Add the following paragraph 3.11.1

3.11.1 The Contractor shall maintain readily accessible to the authorities having jurisdiction, the Architect, and the Owner drawings, project manual and related

documents approved by appropriate building departments and authorities having jurisdiction.

Article 3.12 Shop Drawings, Product Data and Samples

Add the following paragraph 3.12.11

3.12.11 Refer to Section 01 3000 Administrative Requirements for additional requirements.

Article 3.13 Use of the Site

Add the following paragraphs

3.13.1 Damage to road, features, or the grounds, resulting from hauling , storage of materials, or other activities connected with the work shall be repaired by the contractor at his expense to the satisfaction of the Architect.

3.13.2 The contractor and any entity for whom the contractor is responsible shall not erect any sign at the project site without the consent of the owner.

Article 3.16 Access to Work

Add the following to paragraph 3.16

The contractor shall provide proper facilities for such access and observation.

Add the following paragraph 3.16.1

3.16.1 The Contractor shall provide access to the work in preparation and progress as required for special inspection required by the building department or authority having jurisdiction.

ARTICLE 4 - ARCHITECT

Article 4.1.1

Add the following paragraph 4.1.1.1

4.1.1.1 Architect shall mean: Garmann/Miller and Associates, Inc., 38 South Lincoln Drive, Minster, Ohio 45865

ARTICLE 8 - TIME

Add the following to Article 8.4

8.4.Liquidated Damages

8.4.1 Upon Failure to have all work substantially completed within the time period stated, or failure to have the applicable portion of the work substantially complete upon any milestone date, the Owner shall be entitled to retain or recover from the Contractor, as Liquidated Damages, and not as a penalty, the applicable amount set forth in the following table for each and every calendar day thereafter until Contract Completion, unless an extension of time is granted in accordance with the Contract Documents.

Contract Amount	Dollars per Day
less than \$50,000.00	\$300.00
More than \$50,000.00 to \$150,000.00	\$500.00
More than \$150,000.00 to \$500,000.00	\$1000.00
More than \$500,000.00 to \$2,000,000.00	\$2,000.00
More than \$2,000,000.00 to \$5,000,000.00	\$3,000.00
More than \$5,000,000.00	\$4,000.00

8.4.2 The amount of Liquidated Damages is agreed upon by an between the Contractor and the Owner because of the impracticality and extreme difficulty of ascertaining the actual amount of damage the Owner would sustain.

ARTICLE 9 PAYMENT AND COMPLETION

ARTICLE 9.3 - Applications for Payment

Add the following to Article 9.3.1

9.3.1.3 The form of Application for Payment will be a notarized AIA Document G702, Application and Certificate for Payment with AIA Document G703, Continuation Sheet. Applications for payment shall be made at approximately 30 day intervals. The contractor shall submit in triplicate the Application for Payment and Continuation Sheet. The Continuation Sheet (G703) shall be prepared the same as the Schedule of Values.

9.3.1.4 Contractor shall submit with each Application for Payment a notarized affidavit that payroll, bills for equipment, material and any other indebtedness connected with the work for which the previous Applications for Payment submitted and the owner might any way be responsible, have been paid. Also, submit release of liens arising out of the contract from each subcontractor, supplier, material person and laborer of the contract.

9.3.1.5 Schedule of Values (AIA Form G703 - Application and Certificate for Payment Continuation Sheet) shall utilize the table of contents of the Project Manual to identify each line item with title and number of the specification Section. Each line item including subcontracted work shall be shown with separate amounts for labor and material.

9.3.1.5.1 Identify on separate line items; Bonds, Insurance, Permits, Allowances, Site Mobilization, and Project Closeout (punch list, attic stock, project record drawings, training, final cleaning).

9.3.1.5.2 If the project is of sufficient size or nature, the Schedule of Values various items shall be subdivided into areas or units when requested by the Architect.

9.3.1.5.3 The architect reserves the right to use the approved Schedule of Values to determine the cost or credit resulting from any changes to the Work.

9.3.1.6 Labor Payments - Partial payments for labor performed under lump sum contract shall be made at the rate of 92 percent of the amount invoiced through the Application for Payment which shows the total contract completion at 50 percent or greater. After the contract is 50 percent complete, as evidenced by payments in the amount at least 50 percent of the labor contract price to the contractor, no additional funds will be retained. Retained funds will be deposited accordance to Paragraph 9.3.1.8

9.3.1.7 Material Payments - Partial payments for materials delivered on the site, or other point in the vicinity of the Project, or otherwise stored, as approved by the Architect, under lump sum contract shall be made at the rate of 92 percent of the amount invoiced. Payment for material incorporated into the project shall be made at the rate of 100 percent of scheduled value. Retained funds will be deposited accordance to Paragraph 9.3.1.8. The balance such invoiced cost shall be paid when such material is incorporated into and becomes part of the Project.

9.3.1.8 All funds retained shall be deposited in an escrow account with a bank in the state in accordance with the term as, and conditions provided in an escrow agreement executed by the contractor, the Owner and the applicable bank.

9.3.1.9 When the project is complete and there exists no other reason to withhold retainage, the retained percentages held in connection with such portions shall, upon request of the contractor, be released from escrow and paid to the contractor, withholding that amount necessary to assure completion. The amount of fund retained to assure completion of the work shall not be less than two (2) times the value of the work as determined by the Architect and Owner.

Add the following to paragraph 9.3.2

9.3.2.1 Where it is to the owner's best interest, materials stored off site will receive payment provided the contractor furnished to the owner with the monthly application for payment the following:

A list of the materials consigned to the project giving the place of storage, together with copies of invoices and reasons why materials cannot be delivered to the site.

Certification that all items are tagged for delivery to the project and that they will not be used for any other purpose.

Evidence of adequate insurance covering the material stored naming the owner as additionally insured.

The owner and architect shall have the right to inspect all materials stored.

When payment is allowed on account of material delivered on the site of the work or in the vicinity thereof or under the possession and control of the contractor but not yet incorporated therein, such material shall become the property of the owner, but if such material is stolen, destroyed, or damaged by casualty before being used, the contractor will be required to replace it at the contractor's expense

Add the following to paragraph 9.3.3

9.3.3.1 No materials or supplies for the work shall be purchased by the contractor or any subcontractor subject to any chattel mortgage, under conditional sale contract or other agreement by which an interest is retained by the seller.

ARTICLE 11 INSURANCE AND BONDS

11.1 - Contractor's Insurance and Bonds

Add the following to Article 11.1.1:

11.1.1.1 A commercial general liability policy and business automobile liability policy, separately or combined, shall be maintained to provide insurance as set forth in paragraph 11.1.1.

11.1.1.2 Such commercial general liability and business automobile liability insurance may be either combined single limits or split limits as provided below. An umbrella or excess liability policy may be used in combination with the commercial general liability and business automobile insurance to meet such limits:

Contracts in the maximum of \$100,000 or less shall require coverage in the amount of not less than \$1 million general aggregate and per occurrence.

Contracts in excess of \$100,000 but not more than \$5 million shall require coverage in the amount of not less than \$3 million general aggregate and per occurrence.

Such policies shall be endorsed to provide that the general aggregate limit applies separately to each of the insured contractor's projects.

11.1.1.3 If commercial general liability and business automobile liability insurance is written with split limits, the following minimum limits shall be provided:

Contracts in the amount of \$100,000 or less shall require coverage in the amount of not less than \$500,000 for injuries, including death, to one person, and \$1 million per occurrence and \$500,000 property damage.

Contracts in excess of \$100,000 but not more than \$5 million shall require coverage in the amount of not less than \$1 million for injuries, including death, to one person, and \$1 million per occurrence and \$1 million property damage, together with an umbrella or excess liability policy of not less than \$2 million per occurrence.

11.1.1.4 For any demolition, blasting, excavating, tunneling, shoring or similar operations, the contractor shall provide and maintain property damage liability insurance with a limit of liability equal to such limit as specified in the application sections of paragraphs 11.1.1.2 and 11.1.1.3.

11.1.1.5 Insurance policies shall be written on an occurrence basis only.

11.1.1.6 Products and completed operation coverage shall commence with the certification of final Certificate of Payment to the Contractor and extend for not less than two years beyond that date.

11.1.1.7 The Owner shall be provided a copy of the policy and named as a certificate holder on the policies of insurance which are maintained by the Contractor. The Owner shall be notified of any change in policy coverage.

11.1.1.8.6 - If Property Insurance Policy (Builders Risk) is by Contractor, delete article 11.2.2 Failure to Purchase Required Property Insurance.

Omit paragraph 11.1.2 and substitute the following:

11.1.2 The contractor shall furnish surety bonds covering faithful performance of the contract and payment of obligations arising there under. Cost of surety bonds shall be included in contract sum. The amount of each bond shall be equal to one hundred percent (100%) of the contract sum. Bond shall be in a form in compliance with the Ohio Revised Code 153.57.

11.1.2.1 If at any time the owner for justifiable cause shall be dissatisfied with a surety, or sureties, the contractor shall within five (5) days after notice from the owner, substitute an acceptable bond (or bonds) in such form and sum by another surety or sureties as may be satisfactory to the owner. The premiums on such bond shall be paid by the contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished a acceptable bond to the owner.

11.2 Owners Insurance

11.2.1.1 - Owners Property Insurance Policy (Builders Risk): The Owner shall provide and maintain, during the progress of the work and until the execution of the certificate of substantial completion by the architect, a Property (builder's risk) Insurance Policy to cover all work in the course of construction including falsework, temporary buildings and structures and materials used in the construction process, stored on or off site, or while in transit. Such insurance shall be on a "Risk of Direct Physical Loss" form policy and shall insure against the perils of fire and extended coverage and physical loss or damage including, but not limited to, theft, vandalism, malicious mischief, earthquake, tornado, lightning, explosion, breakage of glass, flood, collapse and water damage. It shall also include debris removal, demolition occasioned by enforcement of an applicable legal requirement, and shall cover reasonable compensation for the state's services and expenses required to limit further loss.

11.2.1.2 - Coverage must include provision to pay the reasonable extra costs of expediting temporary and/or permanent repairs to, or permanent replacement of damaged property. This shall include overtime wages and the extra cost of "express" or other means for rapidly transporting materials and supplies necessary to such repair or replacement.

11.2.1.3 - Such builder's risk policy shall protect both the contractor and the owner from loss and provide coverage for materials in transit or stored off site and identified for the project.

11.2.1.4 - Coverage for other perils may be required if specified in the special conditions.

Unless otherwise specified in the contract documents, the builder's risk policy shall be written in the amount equal to 100 percent of the contract price, including landscaping, paving and other site work.

11.2.1.5 - The builder's risk policy shall specifically permit and allow for partial occupancy by the owner prior to acceptance of the project by the architect.

11.2.1.6 Property insurance provided by the Owner shall not cover any tools, apparatus machinery, scaffolding, hoist, forms, staging, shoring, and other similar items commonly referred to construction equipment that may be on site and the capital value of which is not included in the Work, nor shall such insurance cover any material or equipment before these materials and equipment are incorporated into the Work. The contractor shall make its own arrangements for any insurance it may require for such construction equipment, materials, and equipment.

ARTICLE 15 - ARBITRATION

15.4 Arbitration: Delete this article. Arbitration is not an acceptable form of binding dispute resolution for this project.

ARTICLE 16 PAYROLL AND WAGE DETERMINATION

Add the following

16.1 State of Ohio Prevailing Wage Determination

16.1.1 The Ohio Prevailing Wage Rates may be accessed from the Ohio Department of Commerce, Wage & Hour Bureau, at its web site for current edition of wage rates.

16.2 The following wage information shall be furnished to the prevailing wage coordinator, as designated by the owner.

16.2.1 Every contractor and/or subcontractor as soon as he begins work under this contract shall furnish to the prevailing wage coordinator, a schedule of dates during the life of the contract for which he will pay wage to employees of the project. He shall also deliver to the prevailing wage coordinator monthly two (2) certified copies of his payroll for the project.

16.2.2 Each report (monthly) shall state the period covered and exhibit for each employee paid on the project, his name, current address, social security number, number of hours worked each day on the project during the reporting period, the total hours each week on the project as well as the total work on other projects, his hourly rate, his job classification, fringe payment, all deductions from his wages and net pay.

16.2.3 Each report shall also have certification executed by the contractor, subcontractor, or duly appointed agent thereof. It shall recite that the payroll is correct and complete and that the rates shown are not less than those required by the contract. It shall also state the name of the union or plan to whom the withheld or unpaid fringes are to be paid. The first report shall also list each fringe and state if it is paid as cash to the employee or to named plan.

16.2.4 Upon final completion and prior to final payment, the contractor shall execute, deliver, and require its subcontractors to execute and deliver to the prevailing wage coordinator an affidavit stating that the contractor/subcontractor has fully complied with Section 4115.03 to 4115.16 Ohio Revised Code. The contract sum will not be increased because of increases in the prevailing wages or wage rates.

GENERAL NOTES

CONDITIONS PRECEDENT FOR EXECUTION OF AGREEMENT

THE FOLLOWING ITEMS SHALL BE FURNISHED IN TRIPLICATE:

Declaration of Insurance, including property insurance (builders risk)

Ohio Workers Compensation Certificate

A Contract Cost Breakdown Showing itemized Labor & Material amounts for the Total Contract Price

Performance and Payment Bond, Power of Attorney for the bonding agent.

A Certificate of Compliance issued by the Department of Insurance showing the Bonding Co. is licensed to do business in the State of Ohio.

Financial Statement of Bonding Co.

DOCUMENTS REQUIRED AFTER ISSUANCE OF NOTICE TO PROCEED

The architect shall issue a notice to proceed which shall establish the date for commencement of the project time. The contractor will, within 10 days of the date of the Notice to Proceed, furnish the architect in TRIPLICATE:

A Schedule of Values (AIA Document G703, Continuation Sheet)

A Time Schedule of the Work.

A list of proposed Sub-contractors.

A list of Material Suppliers.

An estimated schedule of monthly payments.

DISCRIMINATION AND INTIMIDATION

The prohibition against discrimination and intimidation on account of race, creed, or color, and the provisions as to forfeitures to be applied in the event of violation of contract regarding

same, as contained in sections 153.59 and 153.60, and sections 4112.01 through 4112.99, inclusive, of the Revised Code of Ohio, shall apply to all contracts entered into in conjunction with the work.

END OF SECTION

**SECTION 01 11 00
SUMMARY OF WORK**

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Greenville YOLO Park Restroom
- B. City of Greenville's Name: City of Greenville.
- C. Architect's Name: Garman Miller
- D. The Project consists of the construction of a new restroom facility.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 50 00 - Contracting Forms and Supplements.

1.03 WORK BY OWNER

- A. Items noted NIC (Not in Contract) will be supplied and installed by City of Greenville before Substantial Completion. Some items include:
 - 1. Landscaping

1.04 OWNER OCCUPANCY

- A. City of Greenville intends to occupy the Project upon Substantial Completion.
- B. Schedule the Work to accommodate City of Greenville occupancy.

1.05 WORK SEQUENCE

- A. The owner intends to award contracts soon after the receipt of bids.
- B. Coordinate construction schedule and operations with City of Greenville.

1.06 CONTRACT NO. A - GENERAL CONSTRUCTION

- A. Division 01 - General Requirements:
 - 1. Specification sections listed above.
 - 2. Section 01 70 00: Basic project engineering and layout.
 - 3. Section 01 70 00: Final cleaning.
- B. Provide all Work except Work specifically assigned to other contractors in this Section.

THIS IS A TAX EXEMPT PROJECT.

1.07 ESTIMATE OF CONSTRUCTION COST

- A. The total estimate of construction cost is: Two Hundred and Fifty Thousand Dollars (\$250,000.00)

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 20 00
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 00 50 00 - Contracting Forms and Supplements: Forms to be used.
- B. Section 01 21 00 - Allowances: Payment procedures relating to allowances.

1.03 SCHEDULE OF VALUES

- A. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to 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 of Owner-Contractor Agreement.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Including
 - 1. Bonds
 - 2. Insurances
 - 3. Permits
 - 4. Allowances
 - 5. Mobilization
 - 6. Project Closeout (punch lists, attic stock, project record drawings, training, final cleaning).
- F. Each line item number shall list the material and labor cost.
- G. Include within each line item, a direct proportional amount of Contractor's overhead and profit.
- H. 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. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.
 - 1. AIA G702 shall be an original and the most recent version of the form issued by the American Institute of Architects.
 - 2. AIA G703 - Continuation Sheet: Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Present required information on electronic media printout or in typewritten form.
- E. Execute certification by signature of authorized officer.
- F. 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.

- G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- H. Submit one electronic and three hard-copies of each Application for Payment.
- I. Include the following with the application:
 - 1. Transmittal letter as specified for submittals in Section 01 30 00.
 - 2. Partial release of liens from major subcontractors and vendors.
 - 3. Affidavits attesting to off-site stored products.

1.05 MODIFICATION PROCEDURES

- A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to Contract Documents.
- B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.
- C. Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710 or written form.
- D. For other required changes, Architect will issue a document signed by City of Greenville 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.
- E. For changes for which advance pricing is desired, 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 with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 15 days.
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
 - 1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
 - 2. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.
- G. Formula for Changes in the Contract Sum
 - 1. Definitions
 - a. Labor - All field labor shall be priced at the current base rate, excluding fringe benefits. The payroll is based on straight time only and is to include number of hours as rate of pay for each classification of worker.
 - b. Fringes - All established payroll taxes, assessment of fringe benefits labor. This may include, but is not limited to, FICA, Federal and State Unemployment, Health and Welfare, Pension Funds, Worker's Compensation and Apprentice Funds.
 - c. Equipment Rentals - All charges for certain non-owned heavy or specialized equipment at up to 100 percent of the documented rental cost. No rental charges will be allowed for hand tools, minor equipment, simple scaffold, etc.
 - d. Owned Equipment - All charges for certain owned, heavy or Specialized equipment at up to 100 percent of the cost listed by the Associated Equipment Dealers Blue Book. No recovery will be allowed for hand tools, minor equipment, simple scaffold etc.
 - e. Trucking - A reasonable delivery charge or per mile trucking charges for delivery of require materials or equipment. Charges for use of a pickup truck will not be allowed.
 - f. Materials

- 1) All materials purchased by the contractor and incorporated into the changed Work, showing costs, quantities, or Unit Prices of all items. Reimbursement of material cost shall only be allowed in the amount the Contractor's actual cost, including any and all discounts, rebates or related credits.
- 2) One third (33 percent) of the cost of reusable materials for each use, such as formwork lumber, shoring or temporary enclosures.
- g. Overhead - Includes, but not limited to, telephone, telephone charges, facsimile, telegrams, postage, photos, photocopying, hand tools, simple scaffold, tool breakage, tool repair, tool replacement, tool blades, tool bits, home office estimating and expediting, home office clerical and accounting support, home office labor, legal services, supervision, travel and parking expenses.
- h. Subcontractor - The reasonable cost for all labor and material provided by a Subcontractor whose pricing is included and complies with these pricing guidelines.
2. The cost of Change Orders shall be:
 - a. For each change over \$ 500.00, the contractor shall furnish a detailed, written proposal itemized according to these pricing guidelines. Any subcontractor or material supplier pricing shall be itemized according to these pricing guidelines.
 - b. For extra work completed by the contractor with his own forces: The sum of Labor, Fringes, Equipment Rentals, Owned Equipment, Trucking and Material plus 15 percent of the sum for overhead and profit.
 - c. For extra work completed by Subcontractor of the Contractor: The Subcontractor cost plus 10 percent of the Subcontractor cost for overhead and profit.
3. Miscellaneous:
 - a. The following items are allowable at the cost of the Work with no overhead and profit:
 - 1) The cost of extending the Bond and the cost of extending liability, property damage, builder's risk or specialty coverage insurance
 - 2) Fees for permits, licenses, inspection, test, etc.
 - b. Cost which will not be reimbursed for Change Order Work include the following:
 - 1) Employee Profit Sharing Plans - regardless of how defined or described, the Contractor will pay these charges from Contractor profit.
 - 2) Voluntary Employee - examples are United Way and U.S. Bonds, etc.
- H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- I. 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.
- J. 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.
- K. 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 01 70 00.
 2. Closeout submittals in Section 01 7800 including but not limited to:
 - a. Wavier of Liens
 - b. Record Drawings
 - c. Operation and Maintenance Data
 - d. Warranties and Bonds

- e. Certifications indicating no asbestos and lead solder in potable water systems have been incorporated into the work.
- f. Sign in sheet for Demonstrations and Instructions
- g. Signed receipt for Maintenance Materials (attic stock)
- h. Complete items of work determined by Garmann/Miller & Associates Inc.'s final inspection (completed punch list)

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 21 00
ALLOWANCES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Contingency allowance.
- B. Payment and modification procedures relating to allowances.

1.02 RELATED REQUIREMENTS

- A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

1.03 CONTINGENCY ALLOWANCE

- A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.
 - 1. All overhead and profit contemplated for the Work performed under each Allowance is to be included in the Base Bid.
- B. Funds will be drawn from the Contingency Allowance by Change Order.
- C. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.04 ALLOWANCES SCHEDULE

- A. Contingency Allowance: General Contract - A; Include the stipulated sum/price of \$10,000.00 for use upon Owner's instructions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 23 00
ALTERNATES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of Alternates.
- B. Procedures for pricing Alternates.
- C. Documentation of changes to Contract Sum and Contract Time.

1.02 RELATED REQUIREMENTS

- A. Document 00 41 00 - Bid Form

1.03 GENERAL

- A. Required alternatives are worded briefly. Refer to Specification Sections and Drawings for additional requirements. Claims for additional compensation will not be granted because of omissions or discrepancies due to the brevity.
- B. Bidders shall indicate the addition or deduction amount from the base bid for each alternative requested in the space provided on the bid form.
- C. The cost indicated on the bid form shall include material and labor as may be necessary for the identified alternative.

1.04 ACCEPTANCE OF ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at City of Greenville's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.05 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Alternate completion date of May 26, 2023

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 01 33 23 - Contractor Submittal Form
- B. Section 01 70 00 - Execution and Closeout Requirements: Additional coordination requirements.
- C. Section 01 78 00 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
 - 1. Requests for Interpretation (RFI).
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
 - 11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. Architect will schedule a meeting after Notice of Award.
- B. Attendance Required:
 - 1. City of Greenville.
 - 2. Architect.
 - 3. Contractor.
- C. Agenda:

1. Execution of City of Greenville-Contractor Agreement.
 2. Submission of executed bonds and insurance certificates.
 3. Distribution of Contract Documents.
 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 5. Designation of personnel representing the parties to Contract.
 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 7. Scheduling.
- D. Record minutes and distribute electronic copies within two days after meeting to participants, with an electronic copy to Architect, City of Greenville, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

- A. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Attendance Required:
1. Contractor.
 2. City of Greenville.
 3. Architect.
 4. Contractor's superintendent.
 5. Major subcontractors.
- C. 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. Coordination of projected progress.
 11. Maintenance of quality and work standards.
 12. Effect of proposed changes on progress schedule and coordination.
 13. Other business relating to work.
- D. Project Coordinator to record minutes and distribute electronic copies within 5 days after meeting to participants, with an electronic copy to Architect, City of Greenville, participants, and those affected by decisions made.

3.03 PRE-INSTALLATION MEETINGS (CONFERENCE)

- A. A pre-installation meeting will be schedule at Project Site before construction activity that requires coordination with other construction and as indicated in the Contract Documents.
- B. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting.
- C. Review conditions of installation, preparation and installation procedures and coordination of related work including:
1. Review of scope of work
 2. Review of approved submittals
 3. Manufacturers installation recommendations

4. Deliveries
 5. Possible conflicts
 6. Compatibility problems
 7. Time schedules
 8. Environmental considerations
 9. Warranty requirements
 10. Acceptability of substrates
 11. Inspections and testing requirements
 12. Mockup Review
- D. Do not proceed with installation if the conference cannot be successfully concluded. Resolve impediments to performance of the work and reconvene the conference at the earliest feasible date

3.04 CONSTRUCTION PROGRESS SCHEDULE

- A. Project Coordinator shall within 10 days after date established in Notice to Proceed, submit preliminary schedule to all Prime Contractors for review.
 1. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 2. Include written certification that major contractors have reviewed and accepted proposed schedule.
- B. Within 10 days after joint review, submit complete schedule.
- C. Submit updated schedule with each Application for Payment.

3.05 COORDINATION DRAWINGS

- A. Provide information required by Project Coordinator for preparation of coordination drawings.
- B. Review drawings prior to submission to Architect.
- C. As-Built Site Survey is required and all as-built notes shall be assembled in electronic form and turned into the Architect so that they are able to combine all changes into one set of documents for the Owner and the County.

3.06 SUBMITTAL SCHEDULE

- A. Submit to Architect for review a schedule for submittals in tabular format.
 1. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
 2. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.

3.07 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. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Submittals will be marked as follows: Contractor to take the following action for each respective marking.
 1. No Exceptions Taken:
 - a. Procurement/Fabrication may proceed.
 - b. Copies to be distributed as scheduled.
 2. Note Markings and Confirm

- a. Procurement/Fabrication may proceed based on marks.
 - b. Confirm compliance with markings with a letter on company letter head or resubmitted shop drawings.
- 3. Note Markings, Revise and Resubmit:
 - a. Correct markings on submittal.
 - b. Corrected shop drawings shall be resubmitted before final procurement and fabrication.
 - c. Do not use drawings marked 'resubmit' to be use in conjunction with installation of work.
- 4. Rejected/Incomplete Submittal: Correct submittal and resubmit in its entirety. No Procurement/Fabrication shall start until shop drawings have been completely revised, resubmitted and marked No Exceptions Taken or Note Markings and Confirm.
 - a. Correct submittal and resubmit in its entirety.
 - b. No Procurement/Fabrication shall start until shop drawings have been completely revised, resubmitted and marked No Exceptions Taken or Note Markings and Confirm.
- D. Samples will be reviewed for aesthetic, color, or finish selection.
- E. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

3.08 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.
- B. Submit for Architect's knowledge as contract administrator or for City of Greenville.

3.09 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 01 78 00 - Closeout Submittals:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Warranties and Bonds.
 - 5. Certifications indicating no asbestos and lead solder in potable water systems have been incorporated into the work.
 - 6. Sign in sheet for Demonstrations and Instructions
 - 7. Signed receipt for Maintenance Materials (attic stock)
 - 8. Other types as indicated.
- D. Submit for City of Greenville's benefit during and after project completion.

3.10 SUBMITTAL PROCEDURES

- A. General Requirements:
 - 1. Use a separate transmittal for each item.

2. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 3. 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.
 4. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- 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.
- C. 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.
- D. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
 2. Do not reproduce the Contract Documents to create shop drawings.
 3. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.
- E. Transmit each submittal with a copy of approved submittal form.
1. See Section 01 33 32 Contractor Submittal Form
 2. Electronic copy for use in conjunction with this project is available upon request.
- F. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- G. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
- H. 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.
- I. Schedule submittals to expedite the Project, and coordinate submission of related items.
- J. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- K. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- L. Provide space for Contractor and Architect review stamps.
- M. When revised for resubmission, identify all changes made since previous submission.
- N. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- O. Submittals not requested will not be recognized or processed.

END OF SECTION

**SECTION 01 43 00
QUALITY ASSURANCE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and inspection agencies and services.
- E. Control of installation.
- F. Manufacturers' field services.
- G. Defect Assessment.
- H. Cost of testing: The Owner will employ services of an independent testing agency to perform specified testing and inspections.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- B. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 REFERENCE STANDARDS

- A. IAS AC89 - Accreditation Criteria for Testing Laboratories 2010.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Test Reports: After each test/inspection, promptly submit two copies of report to 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 Architect, provide interpretation of results.
- C. Masonry Inspection
 - 1. Provide masonry inspection of concrete or brick masonry walls as required to insure that masonry construction is in conformance with the Contract Documents.
 - 2. The masonry inspector shall prepare a written report or reports for each day of inspection. Masonry Inspection report.
 - a. Masonry Inspection report attached to this Section.
 - 3. The masonry inspector shall be present and observe all grouting operations in wall requiring inspection. The masonry inspector shall be present at the project site with in sufficient time, in advance of grouting operations, to inspect the construction to insure its conformance to the Contract Documents and that grouting may proceed. Periodically the masonry inspector shall be present during the placement of masonry units and reinforcement.

4. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for grouting operation.
- D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to 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.
 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the City of Greenville's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- F. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for City of Greenville.
 1. Submit report in duplicate within 30 days of observation to Architect for information.
- G. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for City of Greenville.

1.05 QUALITY ASSURANCE

- A. Architect / Owner to obtain and pay for Testing Agencies on site:
 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.
 3. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.

1.06 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 Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

1.07 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. City of Greenville will employ and pay for services of an independent testing agency to perform other specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. Testing and Inspection Agency:

1. Testing agency: Comply with requirements of ASTM E 329, ASTM E 543, ASTM C 1021, ASTM C 1077, ASTM C 1093, and ASTM D 3740.
2. Laboratory: Authorized to operate in State in which Project is located.
3. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
4. 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 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 TESTING AND INSPECTION

- A. See individual specification sections for testing and inspection required.
- B. Testing Agency Duties:
 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 2. Perform specified sampling and testing of products in accordance with specified standards.
 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
 5. Perform additional tests and inspections required by Architect.
 6. 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 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 City of Greenville'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 Architect.
- F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.03 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, start-up of equipment, test, adjust, and balance equipment 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.

3.04 DEFECT ASSESSMENT

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

END OF SECTION

**SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary utilities.
- B. Temporary telecommunications services.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers, enclosures, and fencing.
- E. Security requirements.
- F. Waste removal facilities and services.

1.02 TEMPORARY UTILITIES - SEE SECTION 01 51 00

1.03 TELECOMMUNICATIONS SERVICES BY GENERAL CONTRACTOR

- A. Job Superintendent to be on site and available via cell phone when work is performed.

1.04 TEMPORARY SANITARY FACILITIES BY GENERAL CONTRACTOR

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

1.05 BARRIERS BY GENERAL CONTRACTOR

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide protection for plants designated to remain. Replace damaged plants.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.06 FENCING BY GENERAL CONTRACTOR

- A. Construction: Contractor's option.

1.07 EXTERIOR ENCLOSURES BY GENERAL CONTRACTOR

- 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.

1.08 SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and City of Greenville's operations from unauthorized entry, vandalism, or theft.

1.09 VEHICULAR ACCESS AND PARKING

- A. Coordinate access and haul routes with governing authorities and City of Greenville.

1.10 WASTE REMOVAL BY EACH PRIME CONTRACTOR

- 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 when containers are full.

1.11 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. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 01 51 00
TEMPORARY UTILITIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary Utilities: Electricity, lighting, heat, ventilation, water, and dehumidification.

1.02 RELATED REQUIREMENTS

- A. Section 01 50 00 - Temporary Facilities and Controls:
 - 1. Temporary telecommunications services for administrative purposes.
 - 2. Temporary sanitary facilities required by law.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards current edition.

1.04 TEMPORARY ELECTRICITY

- A. Cost: By City of Greenville.
- B. Connect to City of Greenville's existing power service.
 - 1. Do not disrupt City of Greenville's need for continuous service.
 - 2. Exercise measures to conserve energy.
- C. Complement existing power service capacity and characteristics as required.
- D. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.
- E. Permanent convenience receptacles may be utilized during construction.

1.05 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES BY ELECTRICAL CONTRACTOR

- A. Provide and maintain LED, compact fluorescent, or high-intensity discharge lighting as suitable for the application for construction operations in accordance with requirements of 29 CFR 1926 and authorities having jurisdiction.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- C. Permanent building lighting may be utilized during construction.

1.06 TEMPORARY HEATING

- A. Prior to building enclosure:
 - 1. The Building shall not be considered enclosed until the permanent building shell is essentially completed with exterior openings, windows, and doors closed by permanent or temporary closures.
 - 2. Each contractor is to provide and pay for temporary heat required for their branch of work prior to building enclosure.
- B. After building enclosure:
 - 1. The Building shall be considered enclosed after the permanent building shell is essentially completed with exterior openings, windows, and doors closed by permanent or temporary closures.
 - 2. After building enclosure, the Heating Ventilating and Air Conditioning (HVAC) Contractor shall provide heating systems for temporary heat. The heating system shall permit construction to continue and progress uninterrupted. The HVAC Contractor shall maintain such systems until they are no longer required to maintain specified conditions for construction operations.
 - 3. The HVAC Contractor shall provide temporary heat using one or both of the following methods.
 - a. Method A: Use of permanent system.

- 1) Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and temporary filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts. Effective date of warranties and guarantees for permanent equipment is the date of substantial completion.
- 2) If permanent system is not fully operable or does not have sufficient controls to maintain the necessary heat, the HVAC Contractor shall provide temporary controls to maintain the necessary heat requirements.
- 3) Equipment used shall be cleaned and restored to new condition, except for ordinary wear, prior to final acceptance.
- 4) Cost of filters consumed is the responsibility of the HVAC Contractor.
- b. Method B: Use of Individual Portable Units
 - 1) Provide, maintain, and supervise the operation of temporary portable units, such as gas fired unit heaters, furnaces direct fired make-up air units or similar equipment. Unit shall be properly vented, piped and wired and shall be provided with a thermostat for control. Provide required safety controls.
 - 2) Cost filters consumed is the responsibility of the HVAC Contractor.
- c. See Section 01 5721 IAQ (indoor air quality) Construction and Preoccupancy for additional requirements.
- C. After building enclosure:
 1. Cost of Energy: By General Contractor.
- D. Provide heating devices and heat as needed to maintain specified conditions for construction operations.
- E. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.07 DEHUMIDIFICATION

- A. Prior to building enclosure:
 1. Each contractor is to provide and pay for temporary dehumidification required for their branch of work prior to building enclosure.
- B. After building enclosure:
 1. The Building shall be considered enclosed after the permanent building shell is essentially completed with exterior openings, windows, and doors closed by permanent or temporary closures.
 2. After building enclosure, the General Contractor shall provide systems for dehumidification. The dehumidification system shall permit construction to continue and progress uninterrupted. The General Contractor shall maintain such systems until they are no longer required to maintain specified conditions for construction operations.
 3. Dehumidification system shall be of sufficient size to lower the humidity of the air to permit the installation and application of finish material according to manufacturer's recommendations i.e. wood flooring, casework, ceiling panels, paint etc.
 4. Dehumidification systems shall be of sufficient size to lower the moisture or water content of the substrate to allow for installation or application of finish materials according to manufacturer's recommendations i.e. wood flooring, carpet resilient flooring, epoxy terrazzo etc.
 5. Cost of energy consumed and associated work is the responsibility of the General Contractor.
- C. Prior to operation of permanent equipment for temporary ventilation purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts. Effective date of warranties and guarantees for permanent equipment is the date of

substantial completion.

1.08 TEMPORARY WATER SERVICE

- A. Cost of Water Used: By City of Greenville.
- B. Connect to existing water source.
 - 1. Exercise measures to conserve water.
- C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 57 13
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. Restoration of areas eroded due to insufficient preventive measures.
- D. Performance bond.
- E. Compensation of City of Greenville for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 RELATED REQUIREMENTS

- A. Section 32 11 23 - AGGREGATE BASE AND SURFACING: Temporary and permanent roadways.

1.03 REFERENCE STANDARDS

- A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus 2014.
- B. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity. 1999a (Reapproved 2014).
- C. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles 2015.
- D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles 2015a.
- E. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile 2012.
- F. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples 2017 (Reapproved 2021).

1.04 PERFORMANCE REQUIREMENTS

- A. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.
- B. 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.
- C. Provide to City of Greenville a Performance Bond covering erosion and sedimentation preventive measures only, in an amount equal to 100 percent of the cost of erosion and sedimentation control work.
- D. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- E. 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.
 - 2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.

- F. 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 City of Greenville.
- G. 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 City of Greenville.
- H. 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 City of Greenville; 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.
- I. 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 City of Greenville; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- J. Open Water: Prevent standing water that could become stagnant.
- K. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Erosion and Sedimentation Control Plan:
 - 1. Include:
 - a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
 - b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
 - c. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
 - d. Schedule of temporary preventive measures, in relation to ground disturbing activities.
 - e. Other information required by law.
 - f. Format required by law is acceptable, provided any additional information specified is also included.
 - 2. Obtain the approval of the Plan by authorities having jurisdiction.
 - 3. Obtain the approval of the Plan by City of Greenville.
- C. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.

- D. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Mulch: Use one of the following:
1. Straw or hay.
 2. Wood waste, chips, or bark.
 3. Erosion control matting or netting.
- 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. Bales: Air dry, rectangular straw bales.
1. Cross Section: 14 by 18 inches, minimum.
 2. Bindings: Wire or string, around long dimension.
- D. Bale Stakes: One of the following, minimum 3 feet long:
1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot.
 2. Wood, 2 by 2 inches in cross section.
- E. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
 2. Permittivity: 0.05 sec^{-1} , minimum, when tested in accordance with ASTM D4491.
 3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
 4. Tensile Strength: 100 pounds-force, minimum, in cross-machine direction; 124 pounds-force, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
 5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
 6. Tear Strength: 55 pounds-force, minimum, when tested in accordance with ASTM D4533/D4533M.
 7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.
- F. Silt Fence Posts: One of the following, minimum 5 feet long:
1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot.
 2. Softwood, 4 by 4 inches in cross section.
 3. Hardwood, 2 by 2 inches in cross section.
- G. Gravel: See Section 32 11 23 for aggregate.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

3.03 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: Traffic-bearing aggregate surface.

1. Width: As required; 20 feet, minimum.
 2. Length: 50 feet, minimum.
 3. Provide at each construction entrance from public right-of-way.
 4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
- C. Linear Sediment Barriers: Made of silt fences.
1. Provide linear sediment barriers:
 - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
 - b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
 - c. Along the toe of cut slopes and fill slopes.
 - d. Perpendicular to flow across the bottom of existing and new drainage channels and swales that traverse disturbed areas or carry runoff from disturbed areas; space at maximum of 200 feet apart.
 - e. Across the entrances to culverts that receive runoff from disturbed areas.
 2. Space sediment barriers with the following maximum slope length upslope from barrier:
 - a. Slope of Less Than 2 Percent: 100 feet..
 - b. Slope Between 2 and 5 Percent: 75 feet.
 - c. Slope Between 5 and 10 Percent: 50 feet.
 - d. Slope Between 10 and 20 Percent: 25 feet.
 - e. Slope Over 20 Percent: 15 feet.
- D. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
 2. Straw bale row blocking entire inlet face area; anchor into pavement.
- E. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.
- F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.
- G. Soil Stockpiles: Protect using one of the following measures:
1. Cover with polyethylene film, secured by placing soil on outer edges.
 2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw or hay.
- H. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
1. Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.
- I. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

- A. Traffic-Bearing Aggregate Surface:
1. Excavate minimum of 6 inches.
 2. Place geotextile fabric full width and length, with minimum 12 inch overlap at joints.
 3. Place and compact at least 6 inches of 1 1/2 to 3 1/2 inch diameter stone.
- B. Silt Fences:
1. Store and handle fabric in accordance with ASTM D4873/D4873M.
 2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
 3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum,

- with fabric embedded at least 6 inches in ground.
- 4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground.
- 5. Install with top of fabric at nominal height and embedment as specified.
- 6. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
- 7. Fasten fabric to wood posts using one of the following:
 - a. Four nails per post with 3/4 inch diameter flat or button head, 1 inch long, and 14 gage, 0.083 inch shank diameter.
 - b. Five staples per post with at least 17 gage, 0.0453 inch wire, 3/4 inch crown width and 1/2 inch long legs.
- 8. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.
- 9. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.
- C. Straw Bale Rows:
 - 1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
 - 2. Install bales so that bindings are not in contact with the ground.
 - 3. Embed bales at least 4 inches in the ground.
 - 4. Anchor bales with at least two stakes per bale, driven at least 18 inches into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
 - 5. Fill gaps between ends of bales with loose straw wedged tightly.
 - 6. Place soil excavated for trench against bales on the upslope side of the row, compacted.
- D. Temporary Seeding:
 - 1. When hydraulic seeder is used, seedbed preparation is not required.
 - 2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
 - 3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft.
 - 4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.
 - 5. Incorporate fertilizer into soil before seeding.
 - 6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch deep.
 - 7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
 - 8. Repeat irrigation as required until grass is established.

3.05 MAINTENANCE

- A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.
- B. Repair deficiencies immediately.
- C. Silt Fences:
 - 1. Promptly replace fabric that deteriorates unless need for fence has passed.
 - 2. Remove silt deposits that exceed one-third of the height of the fence.
 - 3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- D. Straw Bale Rows:
 - 1. Promptly replace bales that fall apart or otherwise deteriorate unless need has passed.
 - 2. Remove silt deposits that exceed one-half of the height of the bales.

- 3. Repair bale rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- E. Clean out temporary sediment control structures weekly and relocate soil on site.
- F. 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 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 01 60 00
PRODUCT REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 11 00 - Summary of Work: Lists of products to be removed from existing building.
- B. Section 01 30 00 - Administrative Requirements
- C. Section 01 43 00 - Quality Assurance: Product quality monitoring.
- D. Section 01 60 00.01 Substitution Request Form

1.03 REFERENCE STANDARDS

- A. 16 CFR 260.13 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; Recycled Content Current Edition.
- B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. 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 15 days after date of Agreement.
 - 2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. 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.
- D. 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 from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
- E. Sustainable Design Submittals: Items necessary to document use of sustainable construction materials, products, and practices.
- F. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

PART 2 PRODUCTS

2.01 GENERAL

- A. The Specifications and Drawings are complementary, and what is required by one shall be as if required by all.

- B. The Drawings govern dimensions, details and location of Work. The Drawings shall not be scaled.
- C. Specifications govern quality of materials and workmanship.
- D. In an event of inconsistencies within or between the Drawings and Specifications, the Contractor shall provide the better quality or greater quantity of Work and shall comply with the stricter requirements.

2.02 EXISTING PRODUCTS

- A. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.
- B. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.
 - 1. See Section 01 11 00 for list of items required to be salvaged for reuse and relocation.
 - 2. If reuse of other existing materials or equipment is desired, submit substitution request.

2.03 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 outside the United States, its territories, Canada, or Mexico.
 - 2. Made using or containing CFC's or HCFC's.
 - 3. Made of wood from newly cut old growth timber.
 - 4. Containing lead, cadmium, or asbestos.
- C. Provide interchangeable components of the same manufacture for components being replaced.
- D. Motors: Refer to Section 22 05 13 - Common Motor Requirements for Plumbing Equipment, NEMA MG 1 Type. Specific motor type is specified in individual specification sections.
- E. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.
- F. Cord and Plug: Provide minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

2.04 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.05 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. Garmann/Miller & Associates Inc. will consider request for substitutions up to ten (10) calendar days prior to bid opening.
- B. Proposed substitutions received by Garmann/Miller & Associates Inc., less than ten (10) days to the bid opening, may not be considered.

- C. Submit request using Substitution Request Form 01 60 00.01
 - 1. Submit one copy of request for substitution for consideration. Limit each request to one proposed substitution.
 - 2. Hard Copy Submission: Deliver submittal to Garmann/Miller & Associates Inc. business office.
 - 3. Electronic Submission: Forward via email to Garmann/Miller & Associates Inc.'s Project Manager, Ryan Heitkamp; rheitkamp@creategm.com.
- D. Substitutions will be considered when a product, through no fault of the Contractor, becomes unavailable or unsuitable due to regulatory change.
- E. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- F. A request for substitution constitutes that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Agrees to provide the same or better warranty for the substitution product as there is for the specified product.
 - 3. 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 City of Greenville.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 5. Agrees to reimburse City of Greenville and Architect for review or redesign services associated with re-approval by authorities.
- G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- H. Substitution Submittal Procedure (after contract award):
 - 1. Submit one copies of request for substitution for consideration. Limit each request to one proposed substitution.
- I. Time Frame for Request. When a Substitution Request is received by the office of Garmann / Miller & Associates, Inc, during a normal business day, Architect will have a maximum of three (3) working days to respond to the Substitution Request.
 - 1. Weekends and holidays are not included in the three (3) day response period.
 - 2. Normal working day is considered between 8 AM and 5 PM.
 - 3. Request received between 5 PM and 8 AM may be considered received on the following business day.

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 01 74 19.
- 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. Provide off-site storage and protection when site does not permit on-site storage or protection.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- J. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- K. Prevent contact with material that may cause corrosion, discoloration, or staining.
- L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- M. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

**SECTION 01 60 00.01 - SUBSTITUTION REQUEST FORM
(DURING BIDDING PHASE)**

To: Garmann/Miller Associates Inc, Minster, Ohio

Date: _____

Project: Greenville YOLO Park Restroom

We hereby submit for your consideration the following product instead of the specified item for the above project:

Section	Section Name	Article/Paragraph	Specified Item

Proposed Substitution: _____

Manufacturer: _____ Model: _____

Submit with request all necessary samples and substantiating data to prove equal quality and performance to that which is specified. Clearly mark manufacturer's literature to indicate equality in performance.

Does the Substitution affect dimensions shown on Drawings?

Yes _____ No _____ If yes, clearly indicate changes:

Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution?

Yes _____ No _____ If no, fully explain:

What affect does substitution have on other Contracts or other trades?

What affect does substitution have on the delivery and construction schedule?

Differences between proposed substitution and specified item.

Manufacturer's warranties of the proposed and specified items are:

Same: _____ Different: _____ Explain on an Attachment

The undersigned states that the function, appearance and quality are equivalent or superior to the specified item.

Submitted by		For use by Garmann/Miller	
Signature		Accepted	
Title		Not Accepted	
Firm		Accepted as Noted	
Address		Received Too Late	
email		Insufficient Data	
Telephone		By	
Fax		Date	

END OF SECTION

**SECTION 01 70 00
EXECUTION AND CLOSEOUT REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Pre-installation meetings.
- C. Cutting and patching.
- D. Surveying for laying out the work.
- E. Cleaning and protection.
- F. Starting of systems and equipment.
- G. Demonstration and instruction of City of Greenville personnel.
- H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- I. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- B. Section 01 43 00 - Quality Assurance: Testing and inspection procedures.
- C. Section 01 50 00 - Temporary Facilities and Controls: Temporary exterior enclosures.
- D. Section 01 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
- E. Section 01 79 00 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections
- F. Section 02 41 00 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.
- G. Individual Product Specification Sections:
 - 1. Advance notification to other sections of openings required in work of those sections.

1.03 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2019.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
 - 1. On request, submit documentation verifying accuracy of survey work.
 - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
 - 3. Submit surveys and survey logs for the project record.
- 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 City of Greenville or separate Contractor.

- D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

- A. For surveying work, employ a land surveyor registered in Ohio and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

1.06 PROJECT CONDITIONS

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- D. 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 City of Greenville.
- E. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
 - 1. Minimize amount of bare soil exposed at one time.
 - 2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
 - 3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
 - 4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- F. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.07 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.
- 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 City of Greenville occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of City of Greenville's activities.

1.08 PROHIBITED MATERIAL AND PRACTICES

- A. Contractors are advised that the following materials and practices are prohibited in this project. Each Prime Contractor will be held responsible for compliance by his personnel and the personnel of each of his subcontractors.
 - 1. Use of tobacco products on school property is strictly prohibited.
 - 2. Use of marking pens of any type on surfaces to remain exposed to view in finished building.
 - 3. Penetrations of roof membrane without prior coordination with Roofing Contractor.
 - 4. Burning of any trash or rubbish is prohibited.
 - 5. Use of cabinetry countertops or other equipment as a work surface, walking surface or any other purpose which could result in damage to countertops or equipment.
 - 6. Suspension of systems (acoustical ceilings, piping, ductwork, conduits etc) from joist bridging and deck. Each system shall be supported from the building structure (beams, joist, etc).

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 01 60 00 - 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. Cut, move, or remove items as necessary for access to alterations and renovation work. Replace and restore at completion.
- B. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished work.
- C. Remove debris and abandoned items from area and from concealed spaces.
- D. Close openings in exterior surfaces to protect existing work and salvage items from weather and extremes of temperature and humidity. Insulate ducts and piping to prevent condensation in exposed areas.

- E. Prepare surfaces and remove surface finishes to provide for proper installation of new work and finishes.
- F. Clean substrate surfaces prior to applying next material or substance.
- G. Seal cracks or openings of substrate prior to applying next material or substance.
- H. 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.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify 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.

3.04 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations, ground floor elevations.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 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.

3.06 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. 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.
- C. Each trade is responsible for cutting and patching for their work unless otherwise noted.
- D. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.
- E. 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.
- F. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- G. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- H. Restore work with new products in accordance with requirements of Contract Documents.
- I. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- J. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.
- K. 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.
- L. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
- M. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.

3.07 PROGRESS CLEANING BY EACH CONTRACTOR

- A. Contractors shall provide daily cleanup and removal of rubbish/refuse resulting from their operations including but not limited to bulky debris, packaging, containers, unused material.
- B. Remove pile of debris from the building daily. No pile of debris shall be left in the building overnight.
- C. At reasonable intervals during the progress of Work, not less than once a week, perform a cleaning of dirt, dust and debris. Broom clean floor and paved surfaces and raked clean other surfaces of ground.
- D. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
1. Do not burn or bury rubbish and waste material on project site.

2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

E. Roadway shall remain clear.

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 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 DEMONSTRATION AND INSTRUCTION

- A. See Section 01 79 00 - Demonstration and Training.
- B. See Individual Specification Sections for demonstrations required
- C. The Owner reserves the right to record (electronically on audio tape, video tape or compact disc) any or all of each demonstration. The recordings are intended to be used by the Owner in maintaining the equipment or material installed.

3.11 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.12 FINAL CLEANING

- A. Each Contractor shall perform his respective final clean up and shall leave the Work of the completed project in a clean neat condition.
- B. Execute final cleaning prior to final project assessment.
 1. Clean areas to be occupied by City of Greenville prior to final completion before City of Greenville occupancy.

- C. Each Contractor shall perform shall perform his respective final clean up and shall leave the Work of the completed project in a clean neat condition including the following:
 - 1. Conduct an inspection of sight-exposed interior and exterior surfaces and work areas, to verify that the entire Work is left in broom clean condition.
 - 2. Tunnels and closed off spaces shall be cleaned of packing boxes, wood frame members and other waste materials used in the construction.
 - 3. The entire system of piping and equipment shall be cleaned internally. The Contractor installing those item shall open all direct pockets and strainers, completely blowing down as required and clean strainer screens of all accumulated debris
 - 4. Tanks, fixtures and pumps shall be drained and proved free of sludge and accumulated matter.
 - 5. Temporary labels, stickers etc., shall be removed from fixtures and equipment (Do not remove permanent nameplates, equipment model numbers, rating etc.)
 - 6. Use cleaning materials that are nonhazardous.
 - 7. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
 - 8. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
 - 9. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
 - 10. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
- D. The General Contractor will do final cleaning which will consist of the following to a degree acceptable to the Architect.
 - 1. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels and other foreign material from sight-exposed interior and exterior surfaces.
 - 2. Vacuum all carpeting. Clean and wax VCT floors including a minimum of three (3) coats of wax or the number of coats specified by the manufacturers which ever is greater. Wax to be approved by the Owner prior to waxing.
 - 3. Wash and shine glazing and mirrors.
 - 4. Polish glossy surfaces to a clear shine.
 - 5. Dust cabinets work and remove markings
 - 6. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
 - 7. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
 - 8. Clean site; sweep paved areas, rake clean landscaped surfaces.
 - 9. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.13 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect.
- 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 Architect when work is considered ready for 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 Architect's Substantial Completion

inspection.

- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to City of Greenville-occupied areas.
- G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.14 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 one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the City of Greenville.

END OF SECTION

**SECTION 01 78 00
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 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.
- C. Individual Product Sections: Specific requirements for operation and maintenance data.
- D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by City of Greenville, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
 - 5. Submit two electronic sets of final documents in final form within 10 days after final inspection. Electronic format shall be PDF's on CD's or USB flash drives.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with City of Greenville'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.
- D. Certifications:
 - 1. Submit copies of the certifications listed in this section:
 - a. Certification stating that no flux or solder used for drinking water piping .
 - b. Certification stating that asbestos containing material was not incorporated into the Work.
- E. Receipts:
 - 1. Submit copies of the receipt signed by owner for completed training sessions.
 - a. See individual specifications sections for training required.
 - 2. Submit copies of the receipt signed by owner for maintenance material (attic stock).
 - a. See individual specifications sections for maintenance material (attic stock) required.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 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 City of Greenville.
- 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. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 2. Field changes of dimension and detail.
 - 3. Details not on original Contract drawings.

3.02 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.

3.03 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.
- 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. Additional information as specified in individual product specification sections.
- D. 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.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 - 1. Description of unit or system, and component parts.
 - 2. Identify function, normal operating characteristics, and limiting conditions.
 - 3. Include performance curves, with engineering data and tests.
 - 4. Complete nomenclature and model number of replaceable parts.
- B. 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.
- C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions.

- Include summer, winter, and any special operating instructions.
- D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- E. Provide servicing and lubrication schedule, and list of lubricants required.
- F. Include manufacturer's printed operation and maintenance instructions.
- G. Include sequence of operation by controls manufacturer.
- H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- I. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for City of Greenville's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 3 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- H. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- J. Arrangement of Contents: Organize each volume in parts as follows:
 - 1. Project Directory.
 - 2. Table of Contents, of all volumes, and of this volume.
 - 3. Operation and Maintenance Data: Arranged by system, then by product category.
 - a. Source data.
 - b. Product data, shop drawings, and other submittals.
 - c. Operation and maintenance data.
 - d. Field quality control data.
 - e. Photocopies of warranties and bonds.
 - 4. Design Data: To allow for addition of design data furnished by Architect or others, provide a tab labeled "Design Data" and provide a binder large enough to allow for insertion of at least 20 pages of typed text.
- K. One (1) electronic copy of the Operation and Maintenance Manuals shall be placed on a CD, Thumb Drive, or other form of Mass Storage Device, for the Owners use. Files must be in a PDF format or format approved by the Owner.

3.06 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 City of Greenville'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.
- E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

**SECTION 01 79 00
DEMONSTRATION AND TRAINING**

PART 1 GENERAL

1.01 SUMMARY

- A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.
- B. Training of City of Greenville personnel in operation and maintenance is required for:
 - 1. HVAC systems and equipment.
 - 2. Plumbing equipment.
 - 3. Electrical systems and equipment.
 - 4. Technology Systems.
 - 5. Items specified in individual product Sections.
- C. Training of City of Greenville personnel in care, cleaning, maintenance, and repair is required for:
 - 1. Items specified in individual product Sections.

1.02 RELATED REQUIREMENTS

- A. Section 01 78 00 - Closeout Submittals: Operation and maintenance manuals.
- B. Other Specification Sections: Additional requirements for demonstration and training.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures; except:
 - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
 - 2. Submit one copy to the Commissioning Authority, not to be returned.
 - 3. Make commissioning submittals on time schedule specified by Commissioning Authority.
 - 4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word 2003 preferred.
- B. Draft Training Plans: City of Greenville will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit to Commissioning Authority for review and inclusion in overall training plan.
 - 2. Submit not less than four weeks prior to start of training.
 - 3. Revise and resubmit until acceptable.
 - 4. Provide an overall schedule showing all training sessions.
 - 5. Include at least the following for each training session:
 - a. Identification, date, time, and duration.
 - b. Description of products and/or systems to be covered.
 - c. Name of firm and person conducting training; include qualifications.
 - d. Intended audience, such as job description.
 - e. Objectives of training and suggested methods of ensuring adequate training.
 - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
 - g. Media to be used, such as slides, hand-outs, etc.
 - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
 - 1. Include applicable portion of O&M manuals.
 - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.

3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Training Reports:
 1. Identification of each training session, date, time, and duration.
 2. Sign-in sheet showing names and job titles of attendees.
 3. Include Commissioning Authority's formal acceptance of training session.
- E. Video Recordings: Submit digital video recording of each demonstration and training session for City of Greenville's subsequent use.
 1. Format: DVD Disc.
 2. Label each disc and container with session identification and date.

1.04 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by City of Greenville.
- B. Demonstrations conducted during Functional Testing need not be repeated unless City of Greenville personnel training is specified.
- C. Demonstration may be combined with City of Greenville personnel training if applicable.
- D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
 1. Perform demonstrations not less than two weeks prior to Substantial Completion.
 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

- A. Conduct training on-site unless otherwise indicated.
- B. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.
- C. Provide training in minimum two hour segments.
- D. Training schedule will be subject to availability of City of Greenville's personnel to be trained; re-schedule training sessions as required by City of Greenville; once schedule has been approved by City of Greenville failure to conduct sessions according to schedule will be cause for City of Greenville to charge Contractor for personnel "show-up" time.
- E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
 1. The location of the O&M manuals and procedures for use and preservation; backup copies.

2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
 3. Typical uses of the O&M manuals.
- F. Product- and System-Specific Training:
1. Review the applicable O&M manuals.
 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
 4. Provide hands-on training on all operational modes possible and preventive maintenance.
 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
 6. Discuss common troubleshooting problems and solutions.
 7. Discuss any peculiarities of equipment installation or operation.
 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
 10. Review spare parts and tools required to be furnished by Contractor.
 11. Review spare parts suppliers and sources and procurement procedures.
- G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

**SECTION 02 41 00
DEMOLITION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of built site elements.
- B. Abandonment and removal of existing utilities and utility structures.
- C. Salvage of designated building elements.
- D. Protection of designated vegetation.

1.02 RELATED REQUIREMENTS

- A. Section 01 11 00 - Summary of Work: Limitations on Contractor's use of site and premises.
- B. Section 01 11 00 - Summary of Work: Sequencing and staging requirements.
- C. Section 01 11 00 - Summary of Work: Description of items to be salvaged or removed for re-use by Contractor.
- D. Section - 01 3516.01 Material & Resource Use Confirmation Form
- E. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- F. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- G. Section 01 70 00 - 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.
- H. Section 31 10 00 - Site Clearing: Vegetation and existing debris removal.
- I. Section 31 22 00 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.
- J. Section 31 23 23 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.03 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2019.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Site Plan: Showing:
 - 1. Vegetation to be protected.
 - 2. Areas for temporary construction and field offices.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fill Material: As specified in Section 31 23 23 - Fill.
- B. Aggregates: As specified in Section 32 1123 Aggregate Base and Surfacing
 - 1. Recyclable Aggregate: Concrete and masonry products from on site demolition:
 - a. Remove reinforcing and separate to salvaged metals.
 - b. Remove brick and clay masonry.
 - c. Crush concrete and masonry waste to less than 1 1/2 inch in each direction.

- d. Crush concrete and masonry waste with at least four (4) parts of specified aggregate for each part of concrete waste.
 - e. Material subject to the approval by representative of the testing agency.
- 2. Use of Reclaimed Base:
 - a. Contractor may use a blend of new material in combination with reclaimed aggregate material.
 - b. Material subject to the approval by representative of the testing agency.

PART 3 EXECUTION

3.01 SCOPE

- A. Remove paving and curbs as required to accomplish new work.
- B. Remove other items indicated, for salvage, relocation, and recycling.
- C. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 22 00.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Comply with applicable requirements of NFPA 241.
 - 3. Use of explosives is not permitted.
 - 4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 5. Provide, erect, and maintain temporary barriers and security devices.
 - 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 8. Do not close or obstruct roadways or sidewalks without permit.
 - 9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
 - 10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from City of Greenville.
- C. Do not begin removal until built elements to be salvaged or relocated have been removed.
- D. Protect existing structures and other elements that are not to be removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.
- E. 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.
- F. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- G. If hazardous materials are discovered during removal operations, stop work and notify Architect and City of Greenville; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- H. Perform demolition in a manner that maximizes salvage and recycling of materials.

1. Comply with requirements of Section 01 74 19 - Waste Management.
2. Dismantle existing construction and separate materials.
3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.03 EXISTING UTILITIES

- 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. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to City of Greenville.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to City of Greenville.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.04 SALVAGE BY CONTRACTOR

- A. Contractor shall remove and deliver items shown on the drawings to be salvaged for reuse/reinstallation or delivery to the owner.
 1. Obtain sign receipt when salvaged items have been delivered to the owner.

3.05 PROTECTION OF EXISTING TO REMAIN

- A. Protect designated items to remain as indicated on the drawings.
- B. Protect vegetation including trees and shrubbery as indicated on the drawings.
- C. Perform cutting to accomplish removals neatly.

3.06 DAMAGED WORK

- A. Restoration: If work to remain is damaged or destroyed due to subsequent construction/demolition operations, compensate or replace at no cost to City of Greenville.
- B. Vegetation Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction/demolition operations, compensate or replace at no cost to City of Greenville.
 1. Trees and vegetation will be considered dead when main leader has died back or when 25 percent or more of crown has died .
 2. If a tree is deemed damaged or dead by the owner's representative, \$500 per caliper inch of tree will be assessed.

3.07 DEBRIS AND WASTE REMOVAL

- 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 03 15 21
UNDER SLAB VAPOR/TERMITE/GAS BARRIER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water Vapor barrier sheet.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Vapor barrier placement under concrete slab-on-grade.
- B. Section 01 30 00 - Administrative Requirements
- C. Section 31 23 23 - Fill and Backfill: Aggregate base

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.
- C. ACI 302.1R - Guide to Concrete Floor and Slab Construction.
- D. ACI 302.2R - Guide for Concrete Slabs that receive moisture sensitive flooring materials.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements.
- C. Test Reports: Submit manufacturer's summary of independent laboratory and field testing for effectiveness in subterranean termite exclusion.
- D. Manufacturer's Installation Instructions.
- E. Installer Qualifications: Company specializing in performing work of the type specified and with minimum five years of documented experience.
- F. Summary of test results per paragraph 9.3 of ASTM E1745
- G. Manufacturer's samples and literature.
- H. Manufacturers installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
- I. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1.
- J. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing this type of work and:
 - 1. Having minimum of five (5) years documented experience.
 - 2. Pre-pour inspection shall be completed by a representative of the manufactured material prior to placing of concrete. If time does not allow, representative from Architects office shall be on site to inspect prior to placing concrete.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 UNDER-SLAB VAPOR BARRIER

- A. Vapor Barrier:
 - 1. Manufacturers:
 - a. Basis of Design:
 - 1) Stego Wrap Vapor Barrier (15 mil); Stego Industries, LLC; www.stegoindustries.com.
 - b. Approved Manufacturer's
 - 1) Viper II Under Slab Vapor Barrier (15 mil); ISI Building Products; www.isibp.com
 - 2) Moistop Ultra Under Slab Vapor Barrier (15 mil); Henry; www.henry.com
 - 3) Yellow Guard Under Slab Vapor Barrier (15 mil); Husky Yellow Guard; www.yellowguard.com
 - 4) Substitutions: Not permitted.
 - 2. Vapor barrier and installation accessories for installation under concrete slabs, per ASTM E1745; The use of single ply polyethylene is strictly prohibited.
 - 3. Materials:
 - a. Installation: Comply with ASTM E1643.
 - b. Maintain permeance of less than 0.01 Perms as tested in accordance with mandatory conditioning test per ASTM E1745, Section 7.1 (7.1.1 - 7.1.5)
 - c. Strength: Meeting or exceeding strength per ASTM E1745, Class A
 - d. Minimum Thickness: 15 Mils
 - e. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.
 - 4. Vapor Barrier Accessories:
 - a. Seams: Stego Tape
 - b. Sealing Penetrations of Vapor Barrier: Stego Mastic & Stego Tape
 - c. Perimeter Edge seal:
 - 1) Stego Crete Claw
 - 2) Stego Term Bar
 - 3) Stego Tack Tape, double sided tack tape
 - d. Penetration Prevention: Beast Foot by Stego Industries, LLC.
 - e. Vapor Barrier Safe Screed System; Beast Screed by Stego Industries, LLC.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that soil surfaces are unfrozen.
- B. Verify final grading is complete.
- C. Ensure that subsoil / subbase is approved by Architect or Geo-technical Engineer before beginning installation.

3.02 INSTALLATION - BARRIER SHEET

- A. Comply with ASTM E1643.
- B. Lap joints 6 inches, minimum. Seal joints, seams, penetrations, and edges at adjacent materials with manufacturer's recommended products and follow manufacturer's written instructions.
- C. Install barrier in accordance with ASTM E1643.
 - 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement of concrete whenever possible.
 - 2. Extend barrier to the perimeter of the slab and turn up. Terminate barrier at the top of the slab, otherwise;

- a. at a point acceptable to the structural engineer,
 - b. where obstructed by impediments such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier.
- 3. At a point of termination, seal vapor barrier to the foundation wall, grade beam, or slab itself.
 - a. Seal vapor barrier to the entire slab perimeter using Crete Claw material per manufacturer's instructions.
 - b. Seal vapor barrier to the entire perimeter wall or footing / grade beam with double sided Tack Tape, or both Term Bar and Tack Tape per manufacturer's instructions.
 - c. Ensure the concrete is clean and dry prior to adhering tape.
- 4. Apply seam tap / Crete Claw to clean and dry vapor barrier.
- 5. Seal all penetrations (including pipes) per manufacturer's instructions.
- 6. For interior forming applications, avoid the use of non-permanent stakes driven through the vapor barrier. Use blunt end and or threaded nail stakes (screed pad post) and insert into Beast Foot. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.
- 7. If non-permanent stakes must be driven through the vapor barrier, repair as recommended by vapor barrier manufacturer.
- 8. Use reinforcing bar supports with base section that eliminate or minimize the potential of puncture of the vapor barrier.
- 9. Repair damaged areas with vapor barrier material of same or better permeance, puncture, and tensile strength.
- 10. For vapor barrier-safe concrete screeding applications, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.
- 11. Pre-pour inspection shall be completed by a representative of the manufactured material prior to placing of concrete. If time does not allow, representative from Architects office shall be on site to inspect and sign-off on installation prior to placing concrete.

3.03 PROTECTION

- A. Protect sheet materials from damage after completed installation.
- B. Repair damage to installed sheet materials with manufacturer's recommended products and according to the manufacturer's written instructions.

END OF SECTION

**SECTION 03 30 00
CAST-IN-PLACE CONCRETE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Floors and slabs on grade.
- C. Concrete shear walls and foundation walls.
- D. Concrete paving: Sidewalks, integral curb and approaches
- E. Concrete reinforcement.
- F. Joint devices associated with concrete work.
- G. Concrete Finishing
- H. Concrete curing.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements
- B. Section 03 15 12 - Under Slab Vapor Barrier.
- C. Section 07 92 00 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.
- D. Section 31 2323 - Fill and Backfill: Aggregate base

1.03 REFERENCE STANDARDS

- A. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).
- B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete 1991 (Reapproved 2009).
- C. ACI 301 - Specifications for Structural Concrete 2016.
- D. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).
- F. ACI 305R - Guide to Hot Weather Concreting 2010.
- G. ACI 306R - Guide to Cold Weather Concreting 2016.
- H. ACI 308R - Guide to External Curing of Concrete 2016.
- I. ACI 318 - Building Code Requirements for Structural Concrete 2019, with Errata (2021).
- J. ACI 347R - Guide to Formwork for Concrete 2014, with Errata (2017).
- K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2020.
- L. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.
- M. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2012.
- N. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- O. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2021.
- P. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2021b.

- Q. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens) 2021.
- R. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete 2020.
- S. ASTM C150/C150M - Standard Specification for Portland Cement 2021.
- T. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).
- U. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete 2019.
- V. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019.
- W. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete 2020a.
- X. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete 2021.
- Y. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2020.
- Z. ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete 2010a (Reapproved 2015).
- AA. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete 2019.
- BB. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.
- CC. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers 2020.
- DD. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- EE. NSF 372 - Drinking Water System Components - Lead Content 2022.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix Design: Submit proposed concrete mix design.
 - 1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
 - 2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
 - 3. Indicate proposed mix design complies with fiber reinforcing manufacturer's written recommendations.
- D. Samples: Submit samples of underslab vapor retarder to be used.
 - 1. Submit manufacturer's data on manufactured products.
- E. Test Reports: Submit report for each test or series of tests specified.
- F. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- G. Sustainable Design Submittal: If any fly ash, ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete cast in place, mix design(s) used showing the quantity of portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.

- H. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.
- I. Contractor to submit 'Cold Weather Concrete Procedures; prior to start of cold weather.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.
- D. Acquire cement from same source and aggregate from same source for the entire project.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Moisture Emission Reducing Curing and Sealing Compound: Provide warranty to cost of flooring delamination failures for 10 years.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.
- B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
 - 2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
 - 3. Form Ties: Snap Tie type that will leave no metal within 1 inches of concrete surface.
- C. Earth Forms
 - 1. Side forms of footings may be omitted and concrete placed directly against excavations only when requested by the contractor and accepted by the Architect. When omission of forms is accepted, provide additional concrete required beyond the minimum design profiles and dimensions of footings as detailed.
 - a. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.
 - 2. Side forms are not required at sides of trench footings or other footings where specifically indicated in the plans and details.

2.02 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Type: Deformed billet-steel bars.
 - 2. Finish: Unfinished, unless otherwise indicated.
- B. Smooth Joint Dowel: ASTM A36. Plain steel bars, cut true to length with square ends.
- C. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.
 - 1. Form: Flat Sheets.
 - 2. WWR Style: As indicated on drawings.
 - 3. Minimum yield strength: 65ksi.
- D. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

3. Provide galvanized or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type LH or GU.
 1. Acquire cement for entire project from same source.
- B. Supplementary Cementitious Materials:
 1. Fly Ash: ASTM C618, Type C or F may be used up to a maximum of 25% of the total cementitious materials content in all concrete mixes, unless otherwise noted.
 2. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120 maybe used up to a maximum of 35% of the total cementitious material content in all concrete mixes, unless otherwise noted.
 3. Silica Fume, Microsilica: ASTM C1240
 4. The exact percentages shall be used on a successful test placement on the project site
- C. Fine and Coarse Aggregates: ASTM C33/C33M.
 1. Acquire all aggregates for entire project from same source to maintain uniformity of color size and shape.
 2. ASTM C33, Class 3S, normal weight aggregates, uniformly graded, non-exceeding 1 inch nominal size.
 3. Aggregates
 - a. Course aggregate
 - 1) Fill in stair pans: Gradation #8.
 - 2) All other classes: Gradation #57
- D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.
- E. Structural Fiber Reinforcement: ASTM C1116/C1116M.
 1. Acceptable Fibrous Reinforcement Materials: Polypropylene fiber or antimicrobial fiber
 - a. Polypropylene Fiber type: 100 percent collated fibrillated polypropylene fibers with an average length of 3/4 inch, a minimum specific gravity of 0.9, and a minimum tensile strength of 80 ksi. Polypropylene fibers shall be added to the concrete mix at a rate of 1-1/2 pounds per cubic yard.
 - b. Antimicrobial Fibers: 100 percent virgin homopolymer polypropylene fibers containing no reprocessed olefin materials. Fibers shall be added to the concrete at a rate of 1-1/2 pounds per cubic yard.
 2. Fiber reinforcement requires Architect's approval for sealed concrete finish locations, for horizontal slab on grade, and toppings over structural elevated slabs only. Not be be used for structural, elevated structural, or sloping slabs.
 3. Manufacturers:
 - a. Euclid Chemical Company: www.euclidchemical.com/#sle.
 - b. Fibermesh: www.fibermesh.com/#sle.
 - c. Forta Corporation: www.forta-ferro.com/#sle.
 - d. GCP Applied Technologies: www.gcpat.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ADMIXTURES

- A. Use of admixtures, except air entraining admixture, water reducing admixture and shrinkage reducing admixture are not permitted unless approved by Architect in writing.
- B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- C. Air Entrainment Admixture: ASTM C260/C260M.
 1. Application: Exterior exposed concrete and foundations exposed to freeze - thaw
 2. Manufacturers:

- a. Air-mix or Perma-Air Euclid Chemical Company.
 - b. Sealtight AEA W.R. Meadows Inc..
 - c. Axim Italcementi Group
 - d. Promix, www.promixadmix.com
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- D. High Range Water Reducing Admixture: (Superplasticizer) ASTM C494/C494M Type F or G
- E. Water Reducing Admixture: ASTM C494/C494M Type A.
- 1. Manufacturers:
 - a. Catexol 900N; Axim Italcementi Group.
 - b. Building Systems, Polyheed 1020; BASF Construction Chemicals.
 - c. ADVA 190; Grace Construction Products, W.R. Grace & Co.
 - d. Sidaplast 500; Sika Corporation;
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 ACCESSORIES

- A. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
- 1. Grout: Comply with ASTM C1107/C1107M.
 - 2. Minimum Compressive Strength at 48 Hours, ASTM C109/C109M: 2,000 pounds per square inch.
 - 3. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 7,000 pounds per square inch.
 - 4. Flowable Products:
 - a. BASF Construction Chemicals
 - b. Dayton Superior Corporation: www.daytonsuperior.com/#sle.
 - c. Euclid Chemical Company; NS GROUT: www.euclidchemical.com/#sle.
 - d. Kaufman Products Inc; SureGrout: www.kaufmanproducts.net/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Truncated ADA Paving Units
- 1. Size: 11 3/4 x 11 3/4 x 2 inches
 - 2. Color: as selected by the Architect
 - 3. Standard: ASTM C935 with 800 psi compressive strength, maximum water absorption of 5%
 - 4. Manufacturer:
 - a. Hanover Architectural Products, Hanover PA
 - 1) Product: Hanover Detectable Warning Pavers
 - b. Acceptable Manufacturers:
 - 1) Tile Tech Pavers
 - 2) Stepstone Inc.
 - 3) Substitutions: See Section 01 6000 - Product Requirements.

2.06 BONDING AND JOINTING PRODUCTS

- A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.
- B. Epoxy Bonding System:
- 1. Complying with ASTM C881/C881M and of Type required for specific application.
- C. Waterstops: Bentonite and butyl rubber, complying with NSF 61 and NSF 372.
- 1. Configuration: As indicated on drawings.
 - 2. Size: As indicated on drawings.
 - 3. Manufacturers:
 - a. Swellstop: Greenstreak Inc.

- b. Hydro-flex; BoMetals Inc.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
 - 1. Material: ASTM D1751, cellulose fiber.
 - 2. Manufacturers:
 - a. W. R. Meadows, Inc; Fiber Expansion Joint Filler with Snap-Cap: www.wrmeadows.com/#sle.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with rectangular or round knockout holes for conduit or rebar to pass through joint form at 6 inches on center; ribbed steel stakes for setting.
 - 1. Provide removable plastic cap strip that forms wedge-shaped joint for sealant installation.
 - 2. Height: To suit slab thickness.
 - 3. Manufacturers:
 - a. Pro-Key System; BoMetals Inc.
 - b. No 95 Heavy Duty Tongue and Groove Joint; Heckman Products.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.07 CURING MATERIALS

- A. Curing and Sealing Compound, Moisture Emission Reducing, Membrane-Forming: Liquid, membrane-forming, clear sealer, for application to newly-placed concrete; capable of providing adequate bond for flooring adhesives, initially and over the long term; with sufficient moisture vapor impermeability to prevent deterioration of flooring adhesives due to moisture emission.
 - 1. Comply with ASTM C309 and ASTM C1315 Type I Class b.
 - 2. VOC Content: Less than 350 g/L.
 - 3. Solids Content: 25 percent, minimum.
 - 4. Application: Use at slabs to receive subsequent applied finishes.
 - 5. Manufacturers:
 - a. Floor Seal Technology, Inc; VaporSeal 309 System: www.floorseal.com/#sle.
 - b. BASF Construction Chemicals
 - c. Sinak Corporation; VC5: www.sinak.com/#sle.
 - d. Euclid Chemical Company
 - e. W.R. Meadows
 - f. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Curing and Sealing Compound, Low Gloss: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1 Class A.
 - 1. Application: Use at floors not scheduled to receive a finish.
- C. Curing Compound: ASTM C 309, Type 1, Class A.
 - 1. Application: Use at exterior walks, pavement, curbs, approaches etc.
 - 2. Clear waterborne membrane-forming curing compound.
 - a. Day Chem Rez Cure: Dayton Superior Corporation
 - b. Diamond Clear Vox: Euclid Chemical Co.
 - c. Safe-Cure Clear; Chem Masters
 - d. Substitutions: See Section 01 6000 - Product Requirements.
- D. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- C. Proportioning and Design of Mixes
1. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in AC1 301 using material to be employed on the project for each class of concrete.
 2. Submit written reports of the Architect of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.
- D. Design mixes to provide normal weight concrete with the following properties as indicated on the drawings and schedules.

CONCRETE SCHEDULE ITEM OR STRUCTURE	FINISH	COMPRESSIVE STRENGTH AND OTHER REQUIREMENTS
Suspended slabs and concrete not otherwise indicated	RfFm-Fn SmFm-Fn, if exposed	3,500 P.S.I. at 28 days Normal Weight Concrete: Maximum W/C Ratio = 0.45
Trench footings, footings, and interior foundations and retaining walls	RfFm-Fn SmFm-Fn, if exposed	3,500 P.S.I. at 28 days Maximum W/C Ratio = 0.50
Foundation and retaining walls exposed to exterior	RfFm-Fn SmFm-Fn, if exposed, Unless otherwise noted A6-Fn, where noted.	4,500 P.S.I. at 28 days 4.5% - 7.5% air entrainment Maximum W/C Ratio = 0.45 Mid-Range Water Reducer Required
Interior formed concrete exposed to view	SmFm-Fn	4,000 P.S.I. at 28 days Maximum W/C Ratio = 0.55
Interior floor slabs scheduled to receive mud-set mosaic and quarry tile	Flt-Fn	4,000 P.S.I. at 28 days Maximum W/C Ratio = 0.45 Mid-Range Water Reducer Required
Exposed interior floor slabs and interior slabs scheduled to receive carpet	Tr-Fn1	4,000 P.S.I. at 28 days Maximum W/C Ratio = 0.45 Mid-Range Water Reducer Required
Interior floor slabs scheduled to receive thin-set flooring, resilient flooring and other flooring types, unless otherwise noted	Tr-Fn2	4,000 P.S.I. at 28 days Maximum W/C Ratio = 0.45 Mid-Range Water Reducer Required
Interior floor slabs scheduled to receive a polished surface, and where indicated	Tr-Fn3	4,000 P.S.I. at 28 days Maximum W/C Ratio = 0.45 Mid-Range Water Reducer Required
Interior floor slabs scheduled to receive wood flooring, and where indicated	Tr-Fn4	4,000 P.S.I. at 28 days Maximum W/C Ratio = 0.45 Mid-Range Water Reducer Required
Exterior walks, stoops, steps, aprons, and curbs; exterior formed concrete exposed to view; exterior	NsBrm-Fn Grt-CI-Fn	4,500 P.S.I. at 28 days 4.5% - 7.5% entrainment Maximum W/C Ratio = 0.45

CONCRETE SCHEDULE ITEM OR STRUCTURE	FINISH	COMPRESSIVE STRENGTH AND OTHER REQUIREMENTS
concrete not otherwise indicated		
Metal stair pan fill, toppings over precast deck	---	3,500 P.S.I. at 28 days #8 Aggregate (maximum)
Flowable fill - Type I Utility Trench Backfill	---	50-100 PSI at 28 days Unconfined compression strength per ASTM D4832
Flowable fill - Type II (option) Under Foundations	---	85 PSI at 28 days Unconfined compression strength per ASTM D4832
Lean concrete fill at soft soils or over excavations (option)	---	1,500 P.S.I. at 28 days

- E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by the contractor when characteristics of material, job conditions, weather, test results of other circumstances warrant, as accepted by the Architect. Laboratory test data for revised mix design and strength results must be submitted to the Architect before using in the work.
- F. Admixtures:
1. Use of admixtures: Admixtures, except air entraining mixture, are not allowed except with permission of Architect.
 2. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus 1 - 1/2 percent with the following limits:
 - a. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure (all above grade):
 - 1) 6.0 percent(severe exposure) 3/4 inch max. aggregate
 - 2) Other concrete (not exposed to freezing, thawing, or hydraulic pressure or to receive a surface hardener): 2 percent to 4 percent air
 3. NO calcium chloride will be permitted.
- G. Water-Cement Ratios: Provide concrete for the following with maximum water-cement (W/C) ratios as follows:
1. Subjected to deicers/watertight and freezing and thawing: W/C 0.45
 2. Subjected to Brackish water, salt spray, or deicers: W/C 0.40
 3. Slumps Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - a. Ramps, slabs and sloping surfaces: Not more than 4 inches.
 - b. Reinforced foundation systems: Not less than 1 inch and not more than 4 inches.
 - c. Other concrete: Not less than 1 inch and not more than 4 inches.
- H. Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard, or as recommended by manufacturer for specific project conditions.

2.09 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.
1. When air temperature is between 85 degrees F and 90 degrees F, reduce mixing and delivery time from 1 1/2 hour to 75 minutes, and when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.
 2. Use set retarding admixtures during hot weather only when approved by Architect/Engineer.

3. Additional Water: Adding water to the batch will be permitted only to replace water lost due to evaporation and only under the direct control of the concrete testing agency field representative.
- B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.
- B. Verify that anchors, seats, plates, reinforcing and other items to be cast into concrete are accurately placed, positioned securely and will not cause hardship in placing concrete.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
 1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
 2. Use latex bonding agent only for non-load-bearing applications.
- E. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
 1. Vapor Retarder Over Granular Fill: Install compactible granular fill before placing vapor retarder as indicated on drawings. Do not use sand.
 2. Place, protect, and repair sheet vapor retarder according to ASTM E 1643, ASTM F710, ACI 302.2R-06 and manufacturer's written instructions.
 3. Place vapor barrier sheeting with longest dimension parallel with direction of pour and face laps away from the expected direction of the placement whenever possible.
 4. Run Vapor Retarder up vertical planes to act as a bond break, if not possible terminate as follows:
 - a. At a point acceptable to the Architect or Structural Engineer
 - b. Where obstructed by impediments (such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier).
 - c. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
 5. When applying any adhesive based tape, ensure that the substrate (vapor barrier or concrete) is clean and dry.
 6. Avoid the use of non-permanent stakes driven through vapor retarder. If non-permanent stakes are driven through vapor retarder, repair as recommended by vapor retarder manufacturer.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

- B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306.
- D. Hot Weather Placing: When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305.
- E. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- F. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

- A. Locate joints as indicated on drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
- D. Separate interior slabs on grade from vertical surfaces with underslab building vapor retarder or building paper.
- E. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- F. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Conform to Section 07 9200 for finished joint sealer requirements.
- G. Install joint devices in accordance with manufacturer's instructions.
- H. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- I. Apply sealants in joint devices in accordance with Section 07 9200.
- J. Place concrete continuously between predetermined expansion, control, and construction joints.
- K. Do not interrupt successive placement; do not permit cold joints to occur.
- L. Place control joints in floor slabs in saw cut pattern indicated.
 - 1. Do not exceed 10 foot spacing for 4 inch slabs.
- M. Saw cut joints within 24 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.

3.06 SEPARATE FLOOR TOPPINGS

- A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.
- B. Place required dividers, edge strips, reinforcing, and other items to be cast in.
- C. Apply bonding agent to substrate in accordance with manufacturer's instructions.

3.07 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. An independent testing agency, as specified in Section 01 43 00, will inspect finished slabs for compliance with specified tolerances.
- B. Screed floors level, maintaining the following minimum F(F) Floor Flatness and F(L) Floor Levelness values when measured in accordance with ASTM E1155/ASTM E1155M.

1. Float Finish (Flt-Fn) - Non-critical Floors:
 - a. Specified Overall Value: FF 20/FL 15.
 - b. Minimum Local Value: FF 14/FL 10.
 - c. Apply float finish to monolithic slab surfaces that are to receive trowel finish and subfloors under concrete toppings, thickset tile, sand bed terrazzo, and raised computer floors.
 2. Trowel Finish 1 (Tr-Fn1) - Carpeted Floors, unless otherwise noted.
 - a. Specified Overall Value: FF 25/FL 20.
 - b. Minimum Local Value: FF 17/FL 14.
 - c. Apply trowel finish to monolithic slab surfaces that are to receive carpet and non critical floors where slabs remain exposed, such as mechanical rooms, unless otherwise noted.
 3. Trowel Finish 2 (Tr-Fn2) - Floors with improved flatness/levelness requirements.
 - a. Specified Overall Value: FF 35/FL 25.
 - b. Minimum Local Value: FF 24/FL 17.
 - c. Apply trowel finish to monolithic slab surfaces that are to receive thin-set flooring, resilient flooring, linoleum flooring, fluid-applied flooring, resinous flooring and other flooring types, unless otherwise indicated.
 - 1) At thin-set tile floors, maximum permissible variation shall be ¼ inch to 10 feet from required plane. After surface is steel troweled, apply a fine broom finish.
 4. Trowel Finish 3 (Tr-Fn3) - Floors requiring better than average flatness/levelness.
 - a. Specified Overall Value: FF 45/FL 35.
 - b. Minimum Local Value: FF 30/FL 24.
 - c. Apply trowel finish to monolithic slab surfaces that are scheduled to receive a polished concrete finish, unless otherwise noted.
 5. Trowel Finish 4 (Tr-Fn4) - Wood covered floors, and with other floor finishes as indicated in their technical sections and required by their manufacturers:
 - a. The slab shall be steel troweled to a true level and finished smooth and straight to a tolerance of 1/8inch in any 10 foot radius.
 6. Nonslip Broom Finish (NsBrm-Fn): Apply nonslip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.
 - a. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom, perpendicular to main traffic route. Coordinate required final finish with the A/E before application.
- C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.08 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Finishing Formed Surfaces
 1. Unexposed Rough Form Finish (Rf Fm-Fn): Rub down or chip off fins or other raised areas 1/4 inch or more in height. Repair and patch tie holes and defects.
 - a. Apply to concrete surfaces not exposed to public view.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
 1. Smooth-Formed Finish (Sm Fm-Fn): Concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - a. Apply to concrete surfaces exposed to public view and to be covered with a coating or covering material applied directly to concrete.

2. Grout Cleaned Finish (Grt CI-Fn): Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.
 - a. Apply to concrete surfaces exposed to public view.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 1. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.09 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 1. Normal concrete: Not less than seven days.
- C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- D. Surfaces Not in Contact with Forms:
 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water-fog spray or saturated burlap.
 - a. Spraying: Spray water over floor slab areas and maintain wet.
 - b. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
 2. Final Curing: Begin after initial curing but before surface is dry.
 - a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.

3.10 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 43 00 - Quality Assurance.
- B. The owner will engage and compensate on site testing agency.
- C. Provide free access to concrete operations at project site and cooperate with appointed firm.
- D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- E. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.
- F. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 30 cu yd or less of each class of concrete placed in a day or for each 5000 square feet of surface area placed.
 1. Cure specimens on job site under same conditions as concrete it represents
 2. Test one specimen at 28 days
 3. Test one specimen at 7 days
 4. Retain one specimen in reserve for later testing if required.
 5. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- G. Slump Test
 1. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

2. Perform one slump test for each concrete load at the point of discharge, following procedures of ASTM C143
- H. Floor Tolerance Measurements:
1. Floor flatness and levelness test on floor slabs shall be conducted within 3 days of final troweling and before forms have been removed. Testing shall be performed utilizing the 'Dipstick' method in accordance to ASTM.
 2. Exceptions: Where room size are smaller due to bearing walls, existing construction, etc., the Architect may reduce the number of test or waive the testing. In such cases the Architect will determine the acceptability of the floor flatness and level.

3.11 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.12 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

3.13 CONCRETE WASTE DISPOSAL

- A. Comply with waste Management requirements of Division 01, Construction Waste Management and Disposal
- B. Waste Disposal as Aggregate Material: Dispose of clean hardened concrete waste by crushing and mixing with fill material as fill is placed. Comply with the requirements of the testing agency.
 1. Remove reinforcing and separate to salvaged metals
 2. Crush concrete waste to less than 1 1/2 inch in each direction.
 3. Crush concrete waste with at least four (4) parts of specified aggregate for each part of concrete aggregate. Aggregate material is specified in Section 32 1123.
 4. Do not dispose of concrete waste as fill within 24 inches of finished grade.
- C. Excess Concrete Waste: Remove excess clean concrete waste that cannot be used as fill as described above and other concreting operations waste, and legally dispose of off site.

END OF SECTION

**SECTION 04 05 13
MASONRY MORTARING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mortar for masonry.

1.02 RELATED REQUIREMENTS

- A. Section 04 05 16 - Masonry Grouting
- B. Section 04 05 19 - Masonry Anchorage & Reinforcing
- C. Section 04 05 23 - Masonry Accessories
- D. Section 04 20 00 - Unit Masonry

1.03 REFERENCE STANDARDS

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022.
- B. ASTM C91/C91M - Standard Specification for Masonry Cement 2018.
- C. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022a.
- D. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- E. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- F. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar 2017.
- G. ASTM C476 - Standard Specification for Grout for Masonry 2022.
- H. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).
- I. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry 2020.
- J. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength 2022.
- K. ASTM C1142 - Standard Specification for Extended Life Mortar for Unit Masonry 1995 (Reapproved 2013).
- L. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar 1992a (Reapproved 2014).
- M. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms 2022a.
- N. ASTM C1357 - Standard Test Methods for Evaluating Masonry Bond Strength 2009.
- O. IMIAWC (HW) - Recommended Practices & Guide Specifications for Hot Weather Masonry Construction; International Masonry Industry All-Weather Council Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.
- C. Samples: Submit two samples of mortar, illustrating mortar color and color range.
- D. Reports: Submit reports on mortar indicating compliance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

1.06 PRECONSTRUCTION TESTING

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 43 00 - Quality Assurance.
- B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
 - 1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.08 FIELD CONDITIONS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Hot Weather Requirements: Comply with IMIAWC (HW) .

PART 2 PRODUCTS

2.01 MORTAR APPLICATIONS

- A. At Contractor's option, mortar may be field-mixed from packaged dry materials or made from factory premixed dry materials with addition of water only.
- B. Mortar Color: Natural gray unless otherwise indicated.
- C. Mortar Mix Designs: ASTM C270, Proportion Specification.
 - 1. Masonry below grade and in contact with earth: Type S.
 - a. Color: Natural gray color for non colored block
 - 2. Exterior Cavity Walls: Type S mortar with Type N pointing mortar.
 - a. Color: Natural Gray
 - 3. Exterior, Loadbearing Masonry: Type S.
 - a. Color: Natural Gray
 - 4. Exterior, Non-loadbearing Masonry: Type N.
 - a. Color: Natural Gray
 - 5. Interior, Loadbearing Masonry: Type S.
 - a. Color: Natural Gray
 - 6. Interior, Non-loadbearing Masonry: Type N.
 - a. Color: Natural Gray

2.02 MATERIALS

- A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Type: Types as scheduled in this section.
 - 2. Color:
 - a. Natural Gray
- B. Portland Cement: ASTM C150/C150M.
 - 1. Type: Type I - Normal; ASTM C150/C150M.
 - 2. Color: Standard gray.
- C. Masonry Cement: ASTM C91/C91M.

- D. Water: Clean and potable.
- E. Cold Weather Admixture: Non chloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M Type C.
 - 1. Acceptable Manufacturers:
 - a. Euclid Chemical: ACCELGUARD 80
 - b. Sika: SikaSet NC
 - c. Master Builders Solutions: MasterSet FP 20
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Bonding Agent: Latex type.
- G. Integral Water Repellent Admixture: Polymeric liquid admixture added to mortar at the time of manufacture.
 - 1. Performance of Mortar with Integral Water Repellent:
 - a. Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
 - b. Compressive Strength: ASTM C1314; maximum 5 percent decrease.
 - c. Drying Shrinkage: ASTM C1148; maximum 5 percent increase in shrinkage.
 - 2. Use only in combination with masonry units produced with integral water repellent admixture.
 - 3. Manufacturers:
 - a. GCP Applied Technologies: DRY-BLOCK Mortar Admixture
 - b. Rheomix: Master Builders, Inc., Cleveland, Ohio
 - c. Moxie International: Moxie Shield 1800 Admixture
 - d. Krete Industries, Inc.: Krete Gard Mortar Mix
 - e. SPEC MIX: IWR Integral Water Repellent Mortar
 - f. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 MORTAR MIXING

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- D. Do not use anti-freeze compounds to lower the freezing point of mortar.
- E. If water is lost by evaporation, re-temper only within two hours of mixing.
- F. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.
- G. Do not use calcium chloride in mortar.

2.04 PRECONSTRUCTION TESTING

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 43 00 - Quality Assurance.
- B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
 - 1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.

PART 3 EXECUTION

3.01 PREPARATION

3.02 INSTALLATION

- A. Install mortar to requirements of section(s) in which masonry is specified.
- B. Remove excess mortar from grout spaces.

3.03 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 43 00 - Quality Assurance.
- B. The owner will employ services of an independent testing agency to perform specified testing and inspections
- C. All mortar shall meet the "Proportion Specification" of ASTM C-270 and be made with Portland cement/lime (non air-entrained). The use of masonry cement mortar is strictly prohibited. Use type 'S' for walls below grade and type 'N' for all other walls.

END OF SECTION

**SECTION 04 05 16
MASONRY GROUTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grout for masonry

1.02 RELATED REQUIREMENTS

- A. Section 04 05 13 - Masonry Mortaring
- B. Section 04 05 19 - Masonry Anchorage & Reinforcing
- C. Section 04 05 23 - Masonry Accessories
- D. Section 08 11 13 - Hollow Metal Doors and Frames: Products and execution for grouting steel door frames installed in masonry.

1.03 REFERENCE STANDARDS

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022.
- B. ASTM C91/C91M - Standard Specification for Masonry Cement 2018.
- C. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022a.
- D. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- E. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- F. ASTM C476 - Standard Specification for Grout for Masonry 2022.
- G. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry 2020.
- H. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength 2022.
- I. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar 1992a (Reapproved 2014).
- J. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms 2022a.
- K. ASTM C1357 - Standard Test Methods for Evaluating Masonry Bond Strength 2009.
- L. ASTM E518/E518M - Standard Test Methods for Flexural Bond Strength of Masonry 2022.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used.
- C. Reports: Submit reports on grout indicating compliance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C1019.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

1.06 PRECONSTRUCTION TESTING

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 43 00 - Quality Assurance.
- B. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.
 - 1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.08 FIELD CONDITIONS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Hot Weather Requirements: Comply with IMIABC (HW).

PART 2 PRODUCTS

2.01 GROUT APPLICATIONS

- A. At Contractor's option, grout may be field-mixed from packaged dry materials or made from factory premixed dry materials with addition of water only.
- B. Grout Mix Designs:
 - 1. Bond Beams and Lintels: 2,500 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
 - a. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
 - b. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
 - 2. Engineered Masonry: 2,500 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.
 - a. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
 - b. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

2.02 MATERIALS

- A. Portland Cement: ASTM C150/C150M.
 - 1. Type: Type I - Normal; ASTM C150/C150M.
 - 2. Color: Standard gray.
- B. Grout Materials:
 - 1. Portland Cement: ASTM C150, Type I
 - 2. Grout Aggregate: ASTM C 404.
 - a. Fine Aggregates: Clean, sharp, natural sand free from loam, clay lumps, or other deleterious substances.
 - b. Coarse Aggregates: Clean, uncoated, pea gravel containing no clay, mud, loam, or foreign matter. Maximum aggregate size 3/4 inch.
 - 3. Flyash: ASTM C618-89a, Type C or F may be substituted for up to 20 percent of the total cementitious materials in the grout mix.
- C. Grout Coarse Aggregate: Maximum 3/8 inch size
- D. Water: Clean and potable.
- E. Cold Weather Admixture: Non chloride, noncorrosive, accelerating admixture complying with ASTM C 494 Type C.
 - 1. Acceptable Manufacturers:
 - a. Accelguard 80, Euclid Chemical Co.
 - b. Trimix - NCA; Sonneborn
 - c. Master Builders, Inc., Cleveland, Ohio
 - d. Substitutions: See Section 01600 - Product Requirements.
- F. Bonding Agent: Latex type.
- G. Integral Water Repellent Admixture: Polymeric liquid admixture added to mortar at the time of manufacture.
 - 1. Performance of Mortar with Integral Water Repellent:
 - a. Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.

- b. Compressive Strength: ASTM C1314; maximum 5 percent decrease.
 - c. Drying Shrinkage: ASTM C1148; maximum 5 percent increase in shrinkage.
- 2. Use only in combination with masonry units produced with integral water repellent admixture.
- 3. Manufacturers:
 - a. Dry-Block Mortar Admixture; Forrer Industries, a unit of W.R. Grace & Co., Cambridge, MA
 - b. Rheomix: Master Builders, Inc., Cleveland, Ohio
 - c. Moxie International
 - d. Krete Industries, Inc.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 GROUT MIXING

- A. Grout Mixes shall be plant mix or factory blended (dry mix with water added at the site)
- B. Mix grout in accordance with ASTM C94/C94M.
- C. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.
 - 1. Grout Proportions (by volume): Comply with Table 1, ASTM C476.
 - a. Fine Grout: 1 part portland cement, 0 to 1/10 part hydrated lime or lime putty, 2-1/4 to 3 parts fine aggregate.
 - b. Coarse Grout: 1 part portland cement, 0 to 1/10 part hydrated lime or lime putty, 2-1/4 parts fine aggregate, 1 to 2 parts coarse aggregate.
 - 2. Grout Slump: Properly proportioned grout shall have a slump of 8 to 10 inches.
- D. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- E. Do not use anti-freeze compounds to lower the freezing point of grout.
- F. Do not use calcium chloride in grout.

2.04 PRECONSTRUCTION TESTING

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 43 00 - Quality Assurance.
- B. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.
 - 1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

PART 3 EXECUTION

3.01 PREPARATION

- A. Apply bonding agent to existing concrete surfaces.

3.02 INSTALLATION

- A. Install grout to requirements of section(s) in which masonry is specified.
- B. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.
- C. Do not displace reinforcement while placing grout.
- D. Remove excess mortar from grout spaces.

3.03 GROUTING

- A. Use low-lift grouting techniques subject to other limitations of Contract Documents.

3.04 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 43 00 - Quality Assurance.

- B. The owner will employ services of an independent testing agency to perform specified testing and inspections
- C. Test and evaluate grout in accordance with ASTM C 1019 procedures.
 - 1. Sampling and testing for field quality control will be performed by the Contractor's testing laboratory during the placement of each type of grout fill, as follows:
 - a. Sampling Fresh Grout Fill: ASTM C 172.
 - b. Slump: ASTM C 143; one test for each grout load at point of discharge; and one for each set of compressive strength specimens.
 - c. Air Content: ASTM C 231; one for every other grout load at point of discharge, or when required by an indication of change.
 - d. Compressive Strength Tests: ASTM C 109; one set of compression cubes for each 50 cubic yards or fraction thereof, of each mix design placed in any one day or for each 2,500 square feet of surface area placed, whichever provides more cubes.
 - 1) Specimens:
 - (a) One (1) specimen tested at 7 days.
 - (b) Two (2) specimens tested at 28 days
 - (c) One (1) specimen tested at the direction of the Architect.
 - (d) ASTM C 109; the testing laboratory will take a minimum of one set of 4 standard cubes for each compressive strength test, unless otherwise directed by the Architect.
 - 2) Adjust mix if test results are unsatisfactory and resubmit for review.
 - 3) Grout which does not meet the strength requirements is subject to rejection and removal from the Work at the expense of the Contractor.
 - 4) The Contractor shall provide all samples and conduct testing as required at no cost to the Owner. See Section 01410 for additional information.
 - e. Grout Temperature: Test hourly when air temperature is 40 degrees F and below, and when 80 degrees F and above; and each time a set of compression test specimens is made. Comply with the requirements of Section 03300, Cast-In-Place Concrete for Cold and Hot Weather Placement.
 - f. Evaluation of Quality Control Tests:
 - 1) Do not use grout delivered to the final point of placement which has slump, temperature, or total air content outside the specified values.
 - 2) If the compressive strength tests fail to meet the minimum requirements specified, the grout represented by such tests will be considered deficient in strength and subject to removal, replacement, reconstruction, or to other action required by the Architect, all at the Contractor's expense.

END OF SECTION

SECTION 04 05 19
MASONRY ANCHORAGE & REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Masonry Reinforcement and Anchorage.

1.02 RELATED REQUIREMENTS

- A. Section 04 05 13 - Masonry Mortaring
- B. Section 04 05 16 - Masonry Grouting
- C. Section 04 05 23 - Masonry Accessories
- D. Section 04 2810 Concrete Stone Masonry Assemblies
- E. Section 04 4301 - Stone Masonry Veneer.
- F. Section 05 50 00 - Metal Fabrications: Loose steel lintels.
- G. Section 06 10 00 - Rough Carpentry: Nailing strips built into masonry.
- H. Section 07 21 13 - Board Insulation: Insulation for cavity spaces.
- I. Section 07 84 00 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
- J. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- B. ASTM A580/A580M - Standard Specification for Stainless Steel Wire 2018.
- C. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement 2022.
- D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.
- E. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2022.
- F. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing 2017.
- G. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls 2017.
- H. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting two weeks before starting work of this section; require attendance by all relevant installers, architect and structural engineer.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry anchorage and reinforcing.
- C. Shop Drawings: Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
 - 1. Provide elevations of shear wall reinforcing.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Hot Weather Requirements: Comply with IMIAWC (HW).

PART 2 PRODUCTS

2.01 MORTAR AND GROUT MATERIALS

- A. Masonry Mortaring as specified in Section 04 05 13.
- B. Masonry Grouting as specified in Section 04 05 16.

2.02 REINFORCEMENT AND ANCHORAGE

- A. General:
 - 1. Joint Reinforcement, General ASTM A 951
 - 2. Fabricate from cold-drawn steel wire complying with ASTM A 82, with deformed or embossed continuous side rods and plain cross-rods, with unit width of 1 1/2 to 2 inches less than thickness of wall or partition.
- B. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420) deformed billet steel bars; uncoated.
 - 1. Size and spacing as indicated on the drawings.
 - 2. Use #3 space bars at 48 inch spacing connected to longitudinal reinforcing bars in concrete masonry bond beams to hold bars in proper location.
 - 3. Coupler Systems: Mechanical devices for splicing reinforcing bars; capable of developing full steel reinforcing design strength in tension and compression.
 - a. Mechanical coupler shall develop 125% of the bar tensile strength
 - 4. Shop fabricate bars requiring hooks or bends
- C. Caging Devices and Centering Clips: Nine (9) gauge hot dip galvanized steel wire caging device.
 - 1. Use in hollow concrete masonry cores or cavities to be reinforced with vertical reinforcing steel bars and filled with grout using high-lift grouting.
 - 2. Manufacturers:
 - a. Hohmann & Barnard, Inc: RB Rebar Positioner: www.h-b.com.
 - b. Wirebond: Figure 8 Rebar Positioners: www.wirebond.com.
 - c. Heckman Building Products Inc.: Product #376: www.heckmannbuildingprods.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- E. Single Wythe Joint Reinforcement: Ladder type; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1483 inch (9 gauge) side rods 0.1483 inch (9 gauge) cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
 - 1. Manufacturers:
 - a. Hohmann & Barnard, Inc (Dur-O-Wall); Product 220 Ladder Mesh Series: www.h-b.com.
 - b. Masonry Reinforcing Corporation of America (Wire Bond); Product 200 Series: www.wirebond.com.
 - c. Heckman Building Products Inc.: Product 1100 Series: www.heckmannbuildingprods.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Multiple Wythe Joint Reinforcement: Ladder type; fabricated with moisture drip; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, Class B; 0.1483 inch (9 gauge) side rods with 0.1483 inch (9 gauge) cross rods; width as required to

provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

1. Manufacturers:
 - a. Hohmann & Barnard, Inc (Dur-O-Wall); Product 240 Twin Mesh Series: www.h-b.com.
 - b. Masonry Reinforcing Corporation of America (Wire Bond); Product Ladder 4 wire: www.wirebond.com.
 - c. Heckman Building Products Inc.: Product 1300 Series: www.heckmanbuildingprods.com
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Adjustable Multiple Wythe Joint Reinforcement: Ladder type with adjustable ties or tabs spaced at 16 in on center and fabricated with moisture drip; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/153M, Class B; 0.1875 inch (3/16 inch) side rods with 0.1483 inch (9 gauge) cross rods and adjustable components of 0.1875 inch wire; width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from each masonry face.
 1. Eyes to be 3/16 inch
 2. Plinth (Legs) to be double leg 3/16 inch diameter with compressed legs and designed to secure insulation against outer face of inner wythe of masonry.
 3. Vertical adjustment: Not less than 2 inches.
 4. Manufacturers:
 - a. Hohmann & Barnard, Inc (Dur-O-Wall); Product Lox All 270-EH with compressed 2X hook: www.h-b.com.
 - b. Masonry Reinforcing Corporation of America (Wire Bond); Product Ladder and Eye with HT hook: www.wirebond.com.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.
- H. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch of mortar coverage from masonry face.
 1. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
 2. Manufacturers:
 - a. Hohmann & Barnard, Inc (Duro-O-Wall).; Product 359 weld on tie -301W anchor: www.h-b.com.
 - b. Masonry Reinforcing Corporation of America (Wire Bond); Product Type I Weld on Anchor 1200 Beam Tie: www.wirebond.com.
 - c. Heckmann Building Products, Inc.; Product 315 weld on anchor rod - 318 web tie: www.heckmannbuildingprods.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- I. Intersecting Masonry Wall Joint Reinforcing (Wire Mesh Reinforcing).
 1. Wire mesh wall ties for of 1/2 inch mesh by 16 gauge hot dip mill-galvanized wire, 1 inch less than the width of wall.
 2. Manufacturers:
 - a. Hohmann & Barnard, Inc (Duro-O-Wall).; Product MWT - Mesh Wall Tie: www.h-b.com.
 - b. Masonry Reinforcing Corporation of America (Wire Bond); Product Mesh Wall Tie #1900: www.wirebond.com.
 - c. Heckmann Building Products, Inc.; Product #269 Wire Mesh Wall Tie: www.heckmannbuildingprods.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- J. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
 1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.

2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
3. Vertical adjustment: Not less than 2 inches.
4. Adhesive backed tape 3 inch wide
5. Manufacturers:
 - a. Hohmann & Barnard, Inc (Dur-O-Wall).; Product X-Seal Anchor X Seal Tape.
 - b. Masonry Reinforcing Corporation of America (Wire Bond); Product Type III X Screw on Anchorwiteh Anchor Seal Tape: www.wirebond.com.
 - c. Heckmann Building Products, Inc.; Product 315D-316 (costomized).
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints to be used with standard sash block.
 1. Manufacturers:
 - a. Hohmann & Barnard, Inc; RS Series: www.h-b.com.
 - b. Masonry Reinforcing Corporation of America, Wire Bond; Product 2901 Control Joint www.wirebond.com.
 - c. Bio Metals Inc. Rubber Control Joint www.bometals.com
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Joint Filler: Closed cell neoprene sponge; oversized 50 percent to joint width; self expanding; 3/8 inch thick x width of brick x by maximum lengths available.
 1. Manufacturers:
 - a. Hohmann & Barnard, Inc; NS Close Cell Neoprene Sponge: www.h-b.com/sle.
 - b. Masonry Reinforcing Corporation of America, Wire Bond; Product Vertical Expansion Joint: www.wirebond.com.
 - c. Bio Metals Inc. Closed Cell Neoprene Sponge Rubber Joint Filler, www.bometals.com
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Cavity Mortar Control (Cavity Mortar Diverter): Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
 1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
 2. Thickness: The same thickness of the air space in the cavity. Material should touch both sides of air space (insulation and masonry)
 3. Height: The minimum height is 10 inches.
 4. Manufacturers:
 - a. Mortar Net USA Limited: Product, Mortar Net
 - b. Hohman & Barnard, Inc.; Product Mortar Trap
 - c. Advanced Building Products Inc; Mortar Break: www.advancedflashing.com.
- D. Nailing Strips: Softwood lumber, preservative treated; as specified in Section 06 10 00.
- E. Cavity Vents (Weeps): Molded PVC grilles, insect resistant.
 1. Size: 3/8 inch by 3 5/8 inch by height of masonry unit
 2. Color: To be selected by the Architect
- F. Column Isolation: 3/8 inch thick foam expansion joint filler
 1. Manufacturer:
 - a. W R Meadows Inc.: Product, Ceramar Flexible-Foam
 - b. Williams Products Inc.
 - c. Illinois Products Corporation
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive anchorages and reinforcing.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Clean reinforcement of loose rust
- C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 INSTALLATION GENERAL

- A. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to properly locate openings, movement type joints, returns, and offsets.
- B. Thickness: Build masonry walls to the full thickness shown except single width walls to be nominal unit thickness.
- C. Cut masonry units with motor driven saw designed to cut masonry with clean sharp unchipped edges.

3.04 WEEPS/CAVITY VENTS

- A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.
- B. Install cavity vents in veneer and cavity walls at 32 inches on center horizontally below shelf angles and lintels and near top of walls.

3.05 REINFORCEMENT AND ANCHORAGE - GENERAL, SINGLE WYTHE MASONRY, AND CAVITY WALL MASONRY

- A. Horizontal Joint Reinforcing
 - 1. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
 - 2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
 - 3. Place continuous joint reinforcement in first and second joint below top of walls.
 - 4. Lap joint reinforcement ends minimum 6 inches.
 - 5. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.
 - 6. Provide continuity at corners and walls intersections by use of prefabricated 'L' and 'T' sections.
 - 7. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 16 inches vertically.
- B. Vertical Joint Reinforcing
 - 1. Reinforcement Bars: Secure at locations indicated and to avoid displacement during grouting. Minimum spacing between bars or to masonry surfaces shall be one bar diameter.
 - a. Secure vertical bar locations by use of caging devices and centering clips.
 - b. Welding of splices is not permitted.
 - c. Mechanical couplers:
 - 1) Required for #5 bars and greater.
 - 2) Mechanical coupler shall develop 125% of the bar tensile strength

2. Reinforced Hollow Unit Masonry: Keep vertical cores to be grouted clear of mortar, including bed area of first course.
- C. Bond Beams: At bond beams or other locations for horizontally reinforced masonry, provide special masonry units or saw to accommodate reinforcement.

3.06 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Reinforce stacked bonded unit joint corners and intersections with strap anchors 16 inches on center.

3.07 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.

3.08 REINFORCEMENT AND ANCHORAGES - CAVITY WALL MASONRY

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of openings.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Space anchors at maximum of 24 inches horizontally and 24 inches vertically.
- F. Reinforce stacked bonded unit joint corners and intersections with strap anchors 16 inches on center.

3.09 REINFORCEMENT AND ANCHORAGES - MULTIPLE WYTHE UNIT MASONRY

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- F. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Space anchors at maximum of 24 inches horizontally and 24 inches vertically.
- G. Reinforce stacked bonded unit joint corners and intersections with strap anchors 16 inches on center.

3.10 CONTROL AND EXPANSION JOINTS

- A. Install control and expansion joints
 1. Where shown on the drawings
 2. In accordance with the Brick Industry Association (BIA) recommendations.

3. In accordance with the National Concrete Masonry Association (NCMA) recommendations.
- B. Do not continue horizontal joint reinforcement through control or expansion joints.
- C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- D. Size control joints as indicated on drawings; if not shown, 3/8 inch wide and deep.
- E. Column Isolation from Masonry: Continuously wrap steel columns or structural supports within masonry walls with expansion joint filler sheets (column isolation). Secure sheets with light gauge wire.

3.11 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and glazed frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
 1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Fill cores in hollow concrete masonry units with grout 3 course (24 inches) under bearing plates beams posts and similar items, unless otherwise indicated.
- E. Do not build into masonry construction organic materials that are subject to deterioration.

3.12 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- C. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- D. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
- E. SOURCE QUALITY CONTROL
- F. Masonry Contractor shall water test cavity to verify all water is draining to the exterior through the weeps before continuing with exterior wythe before capping wall.
 1. Contractor shall perform tests in the presence of, A/E, testing lab representative, and General Contractor.
 - a. Do not proceed more than 3 veneer courses above flashing without testing, observation, and picture documentation by testing lab representative.
 2. Contractor shall hold water hose and with standard water pressure force water into the cavity at a cell vent so water can be observed coming out adjacent weeps for a period of at least 5 minutes. Contractor shall continue down the wall to the next cell vent where a weep did not indicate water wicking out and continue this process until the entire length of flashing is tested.
 3. Where water is observed inside the building or outside the building away from the weeps, masonry units shall be removed and flashing re-inspected and repaired.
 4. Water test shall be re-performed where flashing was repaired.

3.13 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 43 00 - Quality Assurance.
 1. The owner is to engage and compensate the on site testing agency.

3.14 PROTECTION

- A. Protect installed units from splashing, stains, mortar, and other damage.

- B. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

3.15 MASONRY WASTE DISPOSAL

- A. Comply with waste Management requirements of Division 01, Construction Waste Management and Disposal

END OF SECTION

**SECTION 04 05 23
MASONRY ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Masonry Accessories
- B. Flashings

1.02 RELATED REQUIREMENTS

- A. Section 04 05 13 - Masonry Mortaring
- B. Section 04 05 16 - Masonry Grouting
- C. Section 04 05 19 - Masonry Anchorage & Reinforcing
- D. Section 06 10 00 - Rough Carpentry: Nailing strips built into masonry.
- E. Section 07 21 13 - Board Insulation: Insulation for cavity spaces.
- F. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications 2022b.
- C. ASTM A580/A580M - Standard Specification for Stainless Steel Wire 2018.
- D. ASTM C55 - Standard Specification for Concrete Building Brick 2017.
- E. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile 2021.
- F. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2022.
- G. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units 2022b.
- H. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing 2017.
- I. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls 2017.
- J. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting two weeks before starting work of this section; require attendance by all relevant installers, architect and structural engineer.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for specified items.
- C. Shop Drawings: Include material samples and installation instructions.

1.06 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store accessories by means that will prevent mechanical damage and contamination by other materials.
- B. Handle and store ceramic glazed masonry units and pre-faced concrete block units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Hot Weather Requirements: Comply with IMIAWC (HW).

PART 2 PRODUCTS

2.01 MORTAR AND GROUT MATERIALS

- A. Masonry Mortaring as specified in Section 04 05 13
- B. Masonry Grouting as specified in Section 04 05 16

2.02 FLASHINGS

- A. Stainless Steel/Polymer Fabric Drainage Plane Flashing - Self-Adhering: ASTM A240/A240M; 2 mil type 304 stainless steel sheet with co-polymer butyl adhesive and a removable release liner on one side and a sheet of non-woven drainage material bonded to the other side.
 - 1. Manufacturers:
 - a. York Manufacturing, Inc; Flash-Vent SA: www.yorkmfg.com.
 - b. Wire-Bond; Bond-N-Flash SA: www.wirebond.com.
 - c. Wall Guardian; Self Adhering Stainless Steel Flashing: www.stscoatings.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Single-Wythe Flashing: High-density polypropylene composition molded into a 5/8 inch thick flashing pan with 5/16 inch perimeter flanges with integral weep spout and insect guard, no visible drip edge.
 - 1. Manufacturers:
 - a. Mortar Net Solutions: Blockflash
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Flashing Termination Bar: Stainless Steel 1/8 inch thick x 1 inch wide with holes at 16 inches on center. Hole size is 5/16 inch (8mm) diameter
 - 1. Manufacturers:
 - a. Advanced Building Products Inc: Stainless Steel Termination Bar
 - b. Hohmann and Barnard Inc.: T1
 - c. Heckmann Building Products: Termination Bar
 - d. Masonry Reinforcing Corporation of America, Wire Bond: Termination Bar
 - e. Substitutions: See Section 01 60 00 - Product Requirements
- D. Flashing End Dams and Corners:
 - 1. Stainless Steel Flashing: ASTM A 666, Type 304, soft temper; 26 gauge thick; finish 2B to 2D.
 - 2. Solder joints to ensure seal.
 - 3. Application: At thru wall flashing end dam, inside corner and outside corner
- E. Sheet Metal Cavity Bridge:
 - 1. Stainless Steel Flashing: ASTM A 666, Type 304, soft temper; 26 gauge thick; finish 2B to 2D.
 - 2. Application: To support thru wall flashing at air spaces and cavity wall insulation.
- F. Sheet Metal Drip Edge:

1. Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gage, 0.0187 inch thick; finish 2B to 2D.
2. Depth: Equal the masonry unit.
3. Application: Where drip edge is required per recommendations of NCMA-Tek 19-4

2.03 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints to be used with standard sash block.
 1. Manufacturers:
 - a. Hohmann & Barnard, Inc; RS Series: www.h-b.com/sle.
 - b. Masonry Reinforcing Corporation of America, Wire Bond; Product 2901 Control Joint www.wirebond.com.
 - c. Bio Metals Inc. Rubber Control Joint www.bometals.com
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Joint Filler: Closed cell neoprene sponge; oversized 50 percent to joint width; self expanding; 3/8 inch thick x width of brick x by maximum lengths available.
 1. Manufacturers:
 - a. Hohmann & Barnard, Inc; NS Close Cell Neoprene Sponge: www.h-b.com/sle.
 - b. Masonry Reinforcing Corporation of America, Wire Bond; Product Vertical Expansion Joint: www.wirebond.com.
 - c. Bio Metals Inc. Closed Dell Neoprene Sponge Rubber Joint Filler, www.bometals.com
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Cavity Mortar Control (Cavity Mortar Diverter): Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
 1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
 2. Thickness: The same thickness of the air space in the cavity. Material should touch both sides of air space (insulation and masonry)
 3. Height: The minimum height is 10 inches.
 4. Manufacturers:
 - a. Mortar Net USA Limited: Product, Mortar Net
 - b. Hohman & Barnard, Inc.; Product Mortar Trap
 - c. Advanced Building Products Inc; Mortar Break: www.advancedflashing.com/#sle.
- D. Nailing Strips: Softwood lumber, preservative treated; as specified in Section 06 10 00.
- E. Cavity Vents (Weeps): Molded PVC grilles, insect resistant.
 1. Size: 3/8 inch by 3 5/8 inch by height of masonry unit
 2. Color: To be selected by the Architect

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Clean reinforcement of loose rust
- C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Install cavity mortar control panels continuously throughout full height of exterior masonry cavities during construction of exterior wythe, complying with manufacturer's installation instructions. Verify that airspace width is no more than 3/8 inch greater than panel thickness. Install horizontally between joint reinforcement. Stagger end joints in adjacent rows. Fit to perimeter construction and penetrations without voids.
- B. Cold Weather Construction: Comply with whichever is the more stringent:
 - 1. The cold weather construction provisions of TMS 602/ACI 530.1/ASCE 6, Article 1.8 C, shall be implemented when the ambient temperature falls below 40 degrees F (4 degrees C)
 - 2. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
 - 3. Frozen Materials and Work:
 - a. Do not use frozen materials mixed or coated with ice or frost.
 - b. Do not build on frozen work.
 - c. Remove and replace masonry work damaged by frost or freezing.
- C. Hot Weather Construction: Comply with whichever is the more stringent:
 - 1. Hot Weather Construction: The cold weather construction provisions of TMS 602/ACI 530.1/ASCE 6, Article 1.8 C, shall be implemented when the ambient temperature exceeds 100 degrees F (37.8 degrees C), or 90 degrees F (32.2 degrees C) with a wind velocity greater than 8 mph (3.58 m/s).
 - 2. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

3.04 PLACING AND BONDING

- A. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- B. Remove excess mortar and mortar smears as work progresses.
- C. Interlock intersections and external corners.
- D. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- E. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
 - 1. Cut masonry units with a motor-driven saw designed to cut masonry.
- F. Cut mortar joints flush where wall tile is scheduled, resilient base is scheduled, or cavity insulation vapor barrier adhesive is applied.
- G. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- H. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.05 WEEPS/CAVITY VENTS

- A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.
- B. Install cavity vents in veneer and cavity walls at 32 inches on center horizontally below shelf angles and lintels and near top of walls.

3.06 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

- C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.07 SINGLE WYTHE FLASHING

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
- B. General: Installed embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- C. Install in accordance to manufacturers' recommendations.
- D. Install with weep spouts flush with the face of the foundation or concrete masonry unit course. Use the reference lip on the bottom of the weep spout to properly position the pan on the foundation or concrete masonry units.
- E. Install with standard mortar spreading techniques with mortar lapped.
- F. Install mesh strips in concrete masonry unit core cavity immediately above each flashing location with the mesh aligned against the outside and inside faces of the block and with each mesh strip touching the flashing pan below it to prevent clogging from mortar and grout droppings.
- G. Remove obstructions from weep spouts, but do not remove the factory-installed insect guards.

3.08 CONTROL AND EXPANSION JOINTS

- A. Install control and expansion joints
 1. Where shown on the drawings
 2. In accordance with the Brick Industry Association (BIA) recommendations.
 3. In accordance with the National Concrete Masonry Association (NCMA) recommendations.
- B. Do not continue horizontal joint reinforcement through control or expansion joints.
- C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- D. Size control joints as indicated on drawings; if not shown, 3/8 inch wide and deep.
- E. Column Isolation from Masonry: Continuously wrap steel columns or structural supports within masonry walls with expansion joint filler sheets (column isolation). Secure sheets with light gauge wire.

3.09 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and glazed frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.
 1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Fill cores in hollow concrete masonry units with grout 3 course (24 inches) under bearing plates beams posts and similar items, unless otherwise indicated.
- E. Do not build into masonry construction organic materials that are subject to deterioration.

3.10 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- C. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- D. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

3.11 CUTTING AND FITTING

- A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.12 SOURCE QUALITY CONTROL

- A. Masonry Contractor shall water test cavity to verify all water is draining to the exterior through the weeps before continuing with exterior wythe before capping wall.
 - 1. Contractor shall perform tests in the presence of, A/E, testing lab representative, and General Contractor.
 - a. Do not proceed more than 3 veneer courses above flashing without testing, observation, and picture documentation by testing lab representative.
 - 2. Contractor shall hold water hose and with standard water pressure force water into the cavity at a cell vent so water can be observed coming out adjacent weeps for a period of at least 5 minutes. Contractor shall continue down the wall to the next cell vent where a weep did not indicate water wicking out and continue this process until the entire length of flashing is tested.
 - 3. Where water is observed inside the building or outside the building away from the weeps, masonry units shall be removed and flashing re-inspected and repaired.
 - 4. Water test shall be re-performed where flashing was repaired.

3.13 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 43 00 - Quality Assurance.
 - 1. The owner is to engage and compensate the on site testing agency.
- B. Masonry Inspection
 - 1. Provide masonry inspection of concrete or brick masonry walls as required to insure that masonry construction is in conformance with the Contract Documents.
 - 2. The masonry inspector shall prepare a written report or reports for each day of inspection. Masonry Inspection report that follows Section 01 4000 shall be used for the reports.
 - 3. The masonry inspector shall be present and observe all grouting operations in wall requiring inspection. The masonry inspector shall be present at the project site with in sufficient time, in advance of grouting operations, to inspect the construction to insure its conformance to the Contract Documents and that grouting may proceed. Periodically the masonry inspector shall be present during the placement of masonry units and reinforcement.
 - 4. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for grouting operation.

3.14 PROTECTION

- A. Protect installed units from splashing, stains, mortar, and other damage.
- B. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

3.15 MASONRY WASTE DISPOSAL

- A. Comply with waste Management requirements of Division 01, Construction Waste Management and Disposal

END OF SECTION

**SECTION 04 20 00
UNIT MASONRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete block.
- B. Clay facing brick.

1.02 RELATED REQUIREMENTS

- A. LEED v4
 - 1. Section 01 33 29.02 - Sustainable Design Reporting LEED v4: Procedures for reporting emissions and VOC content data
 - 2. Section 01 33 29.04 - LEED Data Reporting Form: Form for reporting material content, certifications, emissions, and VOC content data
 - 3. Section 01 33 29 .07 - Prohibited Content Installer Certification: Form for certifying that no non-compliant products were used
 - 4. Section 01 35 66.05 - Project Sustainability Goal Credit Summary LEED v4
 - 5. Section 01 35 66.08 - LEED v4 Project Scorecard
 - 6. Section 01 33 66.12 - Sustainability Certification Project Procedure
 - 7. Section 01 57 19 - Temporary Environmental Controls: Procedures and testing
 - 8. Section 01 57 21.01 - Indoor Air Quality (IAQ) Planning Checklist
 - 9. Section 01 57 21.02 - Indoor Air Quality (IAQ) Inspection Checklist
 - 10. Section 01 57 21.03 - Indoor Air Quality (IAQ) Log
 - 11. Section 01 61 16 - VOC Content Restrictions
 - 12. Section 01 74 19 - Construction Waste Management & Disposal
- B. Section 04 05 13 - Masonry Mortaring
- C. Section 04 05 16 - Masonry Grouting
- D. Section 04 05 19 - Masonry Anchorage & Reinforcing
- E. Section 04 05 23 - Masonry Accessories
- F. Section 06 10 00 - Rough Carpentry: Nailing strips built into masonry.
- G. Section 07 21 13 - Board Insulation: Insulation for cavity spaces.
- H. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile 2021.
- B. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile 2017.
- C. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2021.
- D. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units 2017.
- E. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units 2022a.
- F. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale) 2021.
- G. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- H. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting two weeks before starting work of this section; require attendance by all relevant installers, architect and structural engineer.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for
- C. Shop Drawings: Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
 - 1. Provide elevations of shear wall reinforcing.
- D. Samples: Submit four samples of facing brick, ceramic glazed facing brick, and ceramic glazed structural clay facing tile units to illustrate color, texture, and extremes of color range.
- E. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
- B. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
 - 2. Where one wythe of multi wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Handle and store pre-faced concrete block units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Hot Weather Requirements: Comply with IMIABC (HW).

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Manufacturer: The concrete block manufacturer shall be a member of the National Concrete Masonry Association.
 - 1. Obtain masonry units from one manufacturer to provide uniform texture and color for each kind required for each continuous area and visually related area.
 - 2. All concrete masonry units in fire rated partitions shall be equal to UL Classification D-2 (2 hour)
- B. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
 - 2. Special Shapes: Provide non-standard blocks configured for corners, lintels, control joint edges, and other detailed conditions.
 - a. Use bullnose units at all exposed corners, window jambs and sills.
 - b. Use special 45 degree corner units.

3. Integral Water Repellent: Provide Integral water repellent at all exterior units
 - a. Dry-Block Mortar Admixture; Forrer Industries, a unit of W.R. Grace & Co., Cambridge, MA
 - b. Rheomix: Master Builders, Inc., Cleveland, Ohio
 - c. Axim Italcementi Group
 - d. Krete BGP: Krete Industries, Inc
 - e. Substitutions: See Section 01600 - Product Requirements.
4. Load-Bearing Units: ASTM C 90, normal weight.
 - a. Normal weight, density 125 pcf or greater
 - b. Hollow block, as indicated.
 - c. Type II - Nonmoisture controlled
 - d. Compressive Strength: 2600 psi. minimum average net area compressive strength.
 - e. Exposed Faces: Manufacturer's standard color and texture where indicated.
5. Non-Loadbearing Units: ASTM C 90, normal weight
 - a. Normal weight, density 125 pcf or greater
 - b. Both hollow and solid block, as indicated.
 - c. Compressive Strength: 2600 psi. minimum average net area compressive strength.
 - d. Exposed faces: Manufacturer's standard color and texture.

2.02 BRICK UNITS

- A. Manufacturers:
- B. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
 1. Efflorescence: ASTM C67, "non effloresced"
 2. Color and texture: as selected by Garmann/Miller Associates Inc..
 3. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
 4. Compressive strength: As indicated on drawings, measured in accordance with ASTM C67/C67M.
- C. Brick Type 1
 1. Brick Type 1: Belden Brick Company
 - a. Size: Utility - 4 x 12 x 4
 - b. Color: To match existing brick color on shelterhouse onsite
 - c. Texture: Smooth
 2. Brick Type 1: Watsontown Brick Company
 - a. Size: Utility - 4 x 12 x 4
 - b. Color: To match existing brick color on shelterhouse onsite
 - c. Texture: Smooth
 3. Brick Type 1: Redland Brick , Inc
 - a. Size: Utility - 4 x 12 x 4
 - b. Color: To match existing brick color on shelterhouse onsite
 - c. Texture: smooth
 4. Brick Type 1: Edicott Clay Products Company
 - a. Size: Utility - 4 x 12 x 4
 - b. Color: To match existing brick color on shelterhouse onsite
 - c. Texture: Velour
 5. Brick Type 1: Brampton Brick Company
 - a. Size: Utility - 4 x 12 x 4
 - b. Color: To match existing brick color on shelterhouse onsite
 - c. Texture: Smooth
- D. Substitutions: See section 01 60 00-Product Requirements.

2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Mortaring: Refer to Section 04 05 13
- B. Masonry Grouting: Refer to Section 04 05 16

2.04 MORTAR AND GROUT MIXING

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Clean reinforcement of loose rust
- C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Cold Weather Construction: Comply with whichever is the more stringent:
 - 1. The cold weather construction provisions of TMS 602/ACI 530.1/ASCE 6, Article 1.8 C, shall be implemented when the ambient temperature falls below 40 degrees F (4 degrees C)
 - 2. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
 - 3. Frozen Materials and Work:
 - a. Do not use frozen materials mixed or coated with ice or frost.
 - b. Do not build on frozen work.
 - c. Remove and replace masonry work damaged by frost or freezing.
- B. Hot Weather Construction: Comply with whichever is the more stringent:
 - 1. Hot Weather Construction: The cold weather construction provisions of TMS 602/ACI 530.1/ASCE 6, Article 1.8 C, shall be implemented when the ambient temperature exceeds 100 degrees F (37.8 degrees C), or 90 degrees F (32.2 degrees C) with a wind velocity greater than 8 mph (3.58 m/s).
 - 2. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

3.04 INSTALLATION GENERAL

- A. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to properly locate openings, movement type joints, returns, and offsets.
 - 1. Avoid the use of less than half size units at corners, jambs, returns, offsets and where ever possible.
- B. Thickness: Build masonry walls to the full thickness shown except single width walls to be nominal unit thickness.
- C. Cut masonry units with motor driven saw designed to cut masonry with clean sharp unchipped edges.

3.05 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.

- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.
- D. Brick Units:
 - 1. Bond: Running.
 - 2. Coursing: Two units and two mortar joints to equal 8 inches.
 - 3. Mortar Joints: Concave.

3.06 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
 - 1. Cut masonry units with a motor -driven saw designed to cut masonry.
- H. Cut mortar joints flush where wall tile is scheduled, resilient base is scheduled, or cavity insulation vapor barrier adhesive is applied.
- I. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.07 WEEPS/CAVITY VENTS

- A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

3.08 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.09 REINFORCEMENT AND ANCHORAGES - MULTIPLE WYTHE UNIT MASONRY

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

- F. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Space anchors at maximum of 24 inches horizontally and 24 inches vertically.
- G. Reinforce stacked bonded unit joint corners and intersections with strap anchors 16 inches on center.

3.10 CONTROL AND EXPANSION JOINTS

- A. Install control and expansion joints
 - 1. Where shown on the drawings
 - 2. In accordance with the Brick Industry Association (BIA) recommendations.
 - 3. In accordance with the National Concrete Masonry Association (NCMA) recommendations.
- B. Do not continue horizontal joint reinforcement through control or expansion joints.
- C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- D. Size control joints as indicated on drawings; if not shown, 3/8 inch wide and deep.
- E. Column Isolation from Masonry: Continuously wrap steel columns or structural supports within masonry walls with expansion joint filler sheets (column isolation). Secure sheets with light gauge wire.

3.11 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and glazed frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
 - 1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Fill cores in hollow concrete masonry units with grout 3 course (24 inches) under bearing plates, beams, posts and similar items, unless otherwise indicated.
- E. Do not build into masonry construction organic materials that are subject to deterioration.

3.12 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- C. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- D. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

3.13 CUTTING AND FITTING

- A. Cut and fit for built-in items and built-in items. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.14 SOURCE QUALITY CONTROL

- A. Masonry Contractor shall water test cavity to verify all water is draining to the exterior through the weeps before continuing with exterior wythe before capping wall.
 - 1. Contractor shall perform tests in the presence of, A/E, testing lab representative, and General Contractor.
 - a. Do not proceed more than 3 veneer courses above flashing without testing, observation, and picture documentation by testing lab representative.

2. Contractor shall hold water hose and with standard water pressure force water into the cavity at a cell vent so water can be observed coming out adjacent weeps for a period of at least 5 minutes. Contractor shall continue down the wall to the next cell vent where a weep did not indicate water wicking out and continue this process until the entire length of flashing is tested.
3. Where water is observed inside the building or outside the building away from the weeps, masonry units shall be removed and flashing re-inspected and repaired.
4. Water test shall be re-performed where flashing was repaired.

3.15 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 43 00 - Quality Assurance.
 1. The owner is to engage and compensate the on site testing agency.
- B. Clay Masonry Unit Tests: Test each variety of clay masonry in accordance with ASTM C67/C67M requirements, sampling 5 randomly chosen units for each 50,000 installed.
- C. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.
- D. Test and evaluate mortar in accordance with ASTM C 780 procedures.
 1. Sampling and testing for field quality control will be performed by the testing laboratory during the placement of each type of mortar, as follows:
 - a. Sampling Fresh Mortar: ASTM C 780.
 - b. Compressive Strength Tests: ASTM C 109; one set of compression cubes each day or fraction thereof, of each mix design placed in any one day, unless prior approval of less testing is obtained in writing from Engineer; 1 specimen tested at 7 days, 2 specimens tested at 28 days, and 1 specimen tested at the direction of the Engineer.
 - 1) Specimens:
 - (a) One (1) specimen tested at 7 days.
 - (b) Two (2) specimens tested at 28 days.
 - (c) One (1) specimen tested at the direction of the Architect.
 - 2) Adjust mix if test results are unsatisfactory and resubmit for review.
 - 3) Mortar which does not meet the strength requirements is subject to rejection and removal from the Work at the expense of the Contractor.
 - c. Evaluation of Quality Control Tests:
 - 1) If the compressive strength tests fail to meet the minimum requirements specified, the grout represented by such tests will be considered deficient in strength and subject to removal, replacement, reconstruction, or to other action required by the Architect, all at the Contractor's Expense.
- E. Test and evaluate grout in accordance with ASTM C 1019 procedures.
 1. Test and evaluate grout in accordance with ASTM C 1019 procedures.
 - a. Sampling and testing for field quality control will be performed by the Contractor's testing laboratory during the placement of each type of grout fill, as follows:
 - 1) Sampling Fresh Grout Fill: ASTM C 172.
 - 2) Slump: ASTM C 143; one test for each grout load at point of discharge; and one for each set of compressive strength specimens.
 - 3) Air Content: ASTM C 231; one for every other grout load at point of discharge, or when required by an indication of change.
 - 4) Compressive Strength Tests: ASTM C 109; one set of compression cubes for each 50 cubic yards or fraction thereof, of each mix design placed in any one day or for each 2,500 square feet of surface area placed, whichever provides more cubes.
 - (a) Specimens:
 - (1) One (1) specimen tested at 7 days.

- (2) Two (2) specimens tested at 28 days.
 - (3) One (1) specimen tested at the direction of the Architect.
 - (4) Masonry ASTM C 109; the testing laboratory will take a minimum of one set of 4 standard cubes for each compressive strength test, unless other wise directed by the Architect.
 - (b) Adjust mix if test results are unsatisfactory and resubmit for review.
 - (c) Grout which does not meet the strength requirements is subject to rejection and removal from the Work at the expense of the Contractor.
 - 5) Grout Temperature: Test hourly when air temperature is 40 degrees F and below, and when 80 degrees F and above; and each time a set of compression test specimens is made. Comply with the requirements of Section 03300, Cast-In-Place Concrete for Cold and Hot Weather Placement.
 - b. Evaluation of Quality Control Tests:
 - 1) Do not use grout delivered to the final point of placement which has slump, temperature, or total air content outside the specified values.
 - 2) If the compressive strength tests fail to meet the minimum requirements specified, the grout represented by such tests will be considered deficient in strength and subject to removal, replacement, reconstruction, or to other action required by the Architect, all at the Contractor's expense.
- F. Masonry Inspection
- 1. Provide masonry inspection of concrete or brick masonry walls as required to insure that masonry construction is in conformance with the Contract Documents.
 - 2. The masonry inspector shall prepare a written report or reports for each day of inspection. Masonry Inspection report that follows Section 01 4000 shall be used for the reports.
 - 3. The masonry inspector shall be present and observe all grouting operations in wall requiring inspection. The masonry inspector shall be present at the project site with in sufficient time, in advance of grouting operations, to inspect the construction to insure its conformance to the Contract Documents and that grouting may proceed. Periodically the masonry inspector shall be present during the placement of masonry units and reinforcement.
 - 4. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for grouting operation.

3.16 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.17 PROTECTION

- A. Protect installed units from splashing, stains, mortar, and other damage.
- B. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

3.18 MASONRY WASTE DISPOSAL

- A. Comply with waste Management requirements of Division 01, Construction Waste Management and Disposal
- B. Excess Concrete Masonry Waste: Remove excess clean concrete waste that cannot be used as fill as described above and other masonry operations waste, and legally dispose of off site.

END OF SECTION

**SECTION 06 10 00
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preservative treated wood materials.
- B. Miscellaneous framing and sheathing.
- C. Communications and electrical room mounting boards.
- D. Concealed wood blocking, nailers, and supports.
- E. Miscellaneous wood nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Setting anchors in concrete.
- B. Section 04 20 00 - Unit Masonry
- C. Section 04 21 00 - Clay Unit Masonry
- D. Section 06 17 53 - Shop-Fabricated Wood Trusses.
- E. Section 07 31 13 - Asphalt Shingles
- F. Section 07 62 00 - Sheet Metal Flashing and Trim

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard 2016.
- B. AFPA WCD No.1 - Manual for Wood Frame Construction; American Forest and Paper Association; 2001.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- E. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board 2022.
- F. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2019.
- G. AWWA U1 - Use Category System: User Specification for Treated Wood 2021.
- H. PS 1 - Structural Plywood 2009 (Revised 2019).
- I. PS 20 - American Softwood Lumber Standard 2021.
- J. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber 2019.
- K. SPIB (GR) - Grading Rules 2014.
- L. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17 2018.
- M. WWPA G-5 - Western Lumber Grading Rules 2021.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

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.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.
- C. Provide sustainably harvested wood; see Section 01 60 00 - Product Requirements for requirements.
- D. Provide wood harvested within a 500 mile radius of the project site.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Stud Framing (2 by 2 through 2 by 6):
 - 1. Species: Any allowed under referenced grading rules.
 - 2. Grade: No. 2.
- D. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):
 - 1. Machine stress-rated (MSR) as follows:
 - a. Fb-single (minimum extreme fiber stress in bending): 1350 psi.
 - b. E (minimum modulus of elasticity): 1,300,000 psi.
 - 2. Species: Any allowed under grading rules.
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Roof Sheathing: APA PRP-108, Structural I Rated Sheathing, Exterior Exposure Class 1, and as follows:
 - 1. Grade: Structural 1 Sheathing.
 - 2. Bond Classification: Exposure 1.
 - 3. Performance Category: 5/8 PERF CAT.
 - 4. Span Rating: 40/20.
 - 5. Edges: Square.
 - 6. Trademark: Furnish construction panels that are each factory-marked with a certification mark evidencing compliance with grade requirements
- B. Other Applications:
 - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
 - 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.

3. Other Locations: PS 1, C-D Plugged or better.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 2. Anchors: Toggle bolt type for anchorage to hollow masonry.
- B. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

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. 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 in contact with roofing, flashing, or waterproofing.
 - c. Treat lumber in contact with masonry or concrete.
 - d. Treat lumber less than 18 inches above grade.
 2. Preservative Pressure Treatment of Plywood Above Grade: AWWA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
 - 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.

PART 3 EXECUTION

3.01 PREPARATION

- A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.
- B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- C. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. 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 code authorities may be used in lieu of solid wood blocking.

- C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.04 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.

3.05 INSTALLATION OF CONSTRUCTION PANELS

- A. Subflooring/Underlayment Combination: Glue and nail to framing; staples are not permitted.
- B. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
 - 1. At long edges use sheathing clips where joints occur between roof framing members.
 - 2. Nail panels to framing; staples are not permitted.

3.06 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

3.07 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.08 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01 74 19 - 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 any 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 06 17 53
SHOP-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated wood trusses for roof framing.
- B. Bridging, bracing, and anchorage.

1.02 RELATED REQUIREMENTS

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 2020.
- B. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber 2000.
- C. TPI 1 - National Design Standard for Metal-Plate-Connected Wood Truss Construction 2007 and errata.
- D. TPI BCSI 1 - Building Component Safety Information Booklet: The Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses 2011.
- E. TPI DSB-89 - Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses 1989.
- F. TPI HIB-91 - Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses; Truss Plate Institute; 1991.

1.04 DESIGN REQUIREMENTS

- A. Comply with applicable code for structural loading criteria and fire retardant requirements.
- B. Refer to the drawings for load requirements

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate sizes and spacing of trusses, loads and truss cambers, framed openings . Submit design calculations. Submit six complete sets of drawings and calculations sealed by a professional engineer licensed in Ohio and meeting the requirements of the Ohio Basic Building Code. No fabrication may begin until approved by the State of Ohio
- C. Product Data: Provide truss configurations, bearing and anchor details, bridging and bracing .

1.06 QUALITY ASSURANCE

- A. Truss Design, Fabrication, and Installation: In accordance with TPI 1, TPI DSB-89, and BCSI 1.
- B. Fabricator Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- C. Design under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Ohio.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for loads, seismic zoning, other governing load criteria and fire retardant requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Handle and erect trusses in accordance with TPI BCSI 1.
- B. Store trusses in vertical position resting on bearing ends.

1.09 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated.

PART 2 PRODUCTS

2.01 TRUSSES

- A. Wood Trusses: Designed and fabricated in accordance with TPI 1 and TPI DSB-89 to achieve structural requirements indicated.
 - 1. Connectors: Steel plate.

2.02 MATERIALS

- A. Lumber:
 - 1. Grade: RIS (GR), Grade.
 - 2. Moisture Content: Between 7 and 9 percent.
- B. Lumber Grading Rules: RIS (GR).
- C. Steel Connectors: Hot-dipped galvanized steel sheet, ASTM A653/A653M Structural Steel (SS) Grade 33/230, with G90/Z275 coating; die stamped with integral teeth; thickness as indicated.
- D. Truss Bridging: Type, size and spacing recommended by truss manufacturer.

2.03 ACCESSORIES

- A. Wood Blocking and Framing for Openings: Softwood lumber, S/P/F species, construction grade, 19 percent maximum and 7 percent minimum moisture content.
- B. Fasteners: Electrogalvanized steel, type to suit application.
- C. Bearing Plates: Electrogalvanized steel.

2.04 FABRICATION

- A. Fabricate trusses to achieve structural requirements specified.
- B. Brace wood trusses in accordance with TPI DSB-89 and BCSI 1.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that supports and openings are ready to receive trusses.

3.02 PREPARATION

- A. Coordinate placement of bearing items.

3.03 ERECTION

- A. Install trusses in accordance with manufacturer's instructions and TPI DSB-89 and TPI BCSI 1; maintain a copy of each TPI document on site until installation is complete.
- B. Set members level and plumb, in correct position.
- C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure plumb, and in true alignment until completion of erection and installation of permanent bracing.
- D. Do not field cut or alter structural members without approval of Architect.
- E. Install permanent bridging and bracing.
- F. Install headers and supports to frame openings required.
- G. Frame openings between trusses with lumber in accordance with Section 06 1000.
- H. Coordinate placement of decking with work of this section.

END OF SECTION

**SECTION 07 21 13
BOARD INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation and integral vapor retarder at cavity wall construction, perimeter foundation wall, underside of floor slabs, and exterior wall behind masonry wall finish.
- B. Foam-plastic board insulation for cavity wall, and concealed building insulation.
- C. Air Barrier Wall System w/ Foam Sealant in Board Joints
- D. Foam Insulation at opening perimeter.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete
- B. Section 04 2000 - Unit Masonry
- C. Section 07 21 19 - Foamed-In-Place Insulation: Plastic foam insulation other than boards.

1.03 REFERENCE STANDARDS

- A. D1621- Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- B. D2126- Standard Test Method for Response of Rigid Cellular Plastics to thermal and Humid Aging.
- C. D2842- Standard Test Method for Water Absorption of rigid Cellular Plastics.
- D. ASTM E331-[00]: Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors By Uniform Static Air Pressure Difference.
- E. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2017.
- F. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2019.
- G. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- H. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2021.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- J. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.
- K. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C 2019a.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. See Section 01 6116 VOC Content Restrictions, for VOC submittal procedures
- C. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:

1.05 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.
- B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- C. Insulation inside masonry cavity walls: Foam-Plastic XPS board

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
 - 1. Application: Perimeter Foundation Insulation below slab.
 - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature.
 - 5. R-value; 1 inch of material at 72 degrees F: 5, minimum.
 - 6. Board Size: 24 x 96 inch.
 - 7. Board Thickness: 2 inches.
 - 8. Board Edges: Square.
 - 9. Thermal Resistance: R-value of 4.6 per 1 inch at 75 degrees F mean temperature.
 - 10. Compressive Resistance: 40 psi.
 - 11. Board Density: 1.20 lb/cu ft.
 - 12. Water Absorption, Maximum: 0.3 percent, by volume.
 - 13. Manufacturers:
 - a. Dow Chemical Co: Styrofoam Square Edge, www.dow.com.
 - b. Owens Corning Corporation; FOAMULAR Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com/sle.
 - c. Kingspan Insulation LLC; GreenGuard XPS Type IV, 25 psi: www.kingspan.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Foam-Plastic Polystyrene Board Insulation
 - 1. Extruded-Polystyrene Board Insulation: ASTM C 578, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
 - a. Rigid closed cell extruded polystyrene foam insulation.
 - b. Comply with ASTM C 578-95, Type IV, density 1.6 lb/cu. ft. min. compressive resistance 25 psi (ASTM D 1621-94)
 - c. Thermal resistance: R-values of 6.0 and 5.6 min. per inch °F-ft²-h/Btu2/inch at 40 °F and 75 °F respectively (ASTM C 518-98).
 - d. Water absorption: Max. 0.1% by volume (ASTM C 272-91 (96)).
 - e. Surface Burning Characteristics (ASTM C 578-95)
 - 1) Flame spread: 0.04
 - 2) Smoke Developed: 155.
 - f. Panel dimensions:
 - 1) Masonry Wall Cavity nominal thickness: 2 1/2"
 - 2) Board size: 48" x 96" overlapping edge behind siding or EIFS or 15 3/4" x 96" square edge behind masonry.
 - g. Manufacturers:

- 1) The Dow Chemical Company STYROFOAM™ Brand CAVITYMATE™ Ultra Extruded Polystyrene Foam Insulation
 - 2) Owens Corning, CW-15, www.owenscorning.com
 - 3) Johns Manville, www.johnsmanville.com
 - 4) Pactiv Building Products: Greenguard SB
 - 5) Substitutions: See Section 01 6000 - Product Requirements.
- C. Glass Fiber Polyisocyanurate Insulation
1. Continuous Exterior Insulation: Glass-fiber-reinforced enhanced polyisocyanurate foam core sheathing faced with nominal 4 mil embossed blue acrylic-coated aluminum on one side and 1.25 mil embossed aluminum on the other side, complying with ASTM C1289 and meeting the following physical properties:
 - a. ASTM C1289 type 1, class 2.
 - b. Compressive Strength (ASTM D1621): 25 psi, minimum.
 - c. Aged thermal Resistance (ASTM C518, measured at Mean Temp of 75F: F-6.5 at 1 inch, RSI 1.06 per 1 inch thickness with 15 year thermal warranty.
 - d. Flexural Strength (ASTM C203): Minimum 55 psi.
 - e. Water Absorption (ASTM C209): Minimum 0.1 percent by volume.
 - f. Water Vapor Permeance (ASTM E96): <0.03 perms.
 - g. Maximum Use Temperature: 250 degrees F.
 - h. Class A, less than and/or equal to 25 Flame spread Index and less than 450 Smoke Developed Index, classified at Max. thickness per UL 723 criteria or ASTM E84 criteria.
 - i. Panel Size: 4'-0" wide x 8'-0" [12'-0"] long, square edge, shiplap (shiplap on thickness of 1.55: and greater) panels.
 - j. Thickness and Stabilized R-Value: Nominal 0.625 inch thickness, 2.5 inch thickness, R-15
 2. Manufacturers
 - a. The Dow Chemical Company "THERMAX- XARMOR ci Exterior Insulation.
 - b. Owens Corning, CW-15, www.owenscorning.com
 - c. Johns Manville, www.johnsmanville.com
 - d. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESSORIES

- A. Provide all Accessories that are approved per manufacturers installation instructions.
- B. Adhesive: Provide insulation manufacturer's recommended adhesive.
 1. Product: The Dow Chemical Company GREAT STUFF PRO™ Gaps & Cracks single component insulating foam sealant where necessary
- C. Joint Sealants
 1. LiquidArmor LT(low temp application)
 - a. Fluid Applied with Trowel
 - b. Installed during low temperature applications
 - c. Used to create seamless barriers at rough openings of windows and doors as well as insulation joints.
 - d. Can be used in temps as low as -20 degrees F
 - e. Will withstand rain within 15 minutes of installation, however do not apply over wet surfaces.
 - f. Complies with ASTM E331, & ASTM E2357
 - g. Shall be applied per manufacturers' recommendations and instructions
 2. LiquidArmor CM - (warm spray application)
 - a. Can be sprayed between 40 degrees and 120 degrees F
 - b. Read and follow all manufacturers's instructions
 - c. Spray with a max of 3,300 PSI

- d. Apply minimum of four inches wide
 - e. Apply at a minimum of 50 wet mills
- D. Penetration Filler: Provide insulated sheathing manufacturer's recommended polyurethane foam for sealing penetrations of insulated sheathing.
 - 1. Products:
 - a. The Dow Chemical Company "GREAT STUFF PRO™ Gaps & Cracks" single component polyurethane insulating foam sealant.
 - b. The Dow Chemical Company "GREAT STUFF PRO™ Window & Door" single component polyurethane low-pressure foam sealant.
- E. Gap Air Infiltration Filler: Two Component, Quick Cure Polyurethane Foam
 - 1. NFPA 286 Approval for Exposed use to the interior of the building without the need for a 15-min thermal barrier.
 - 2. ASTM E-84 Class A
 - 3. Product: The Dow Chemical Company FROTH-PAK™ Foam Insulation two component, quick-cure polyurethane foam

2.04 SPRAY FOAM INSULATION

- A. Foam Sealant: One-component, minimal expanding, low pressure-build, flexible polyurethane foam formulated to air seal the gap around a window or door frame and the rough opening.
- B. Foam expanded to generate an effective seal, and will not to distort or bow window and door frames.
- C. Manufactures:
 - 1. Dow Building Solutions: www.dow.com; Product, Great Stuff Pro.
 - 2. Dupont: www.dupont.com; Product, Window and Door Foam.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.05 ACCESSORIES

- A. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.
- B. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.
- C. Wire Mesh: Galvanized steel, hexagonal wire mesh.
- 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 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Apply adhesive to back of boards:
 - 1. Three continuous beads per board length.
- B. Install boards vertically on foundation perimeter.
 - 1. Place boards to maximize adhesive contact.
 - 2. Butt edges and ends tightly to adjacent boards and to protrusions.
- C. Extend boards over expansion joints, unbonded to foundation on one side of joint.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION AT EXTERIOR WALLS

- A. Apply adhesive to back of boards:
 - 1. Three continuous beads per board length.

- B. Install boards horizontally on walls.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.
 - 3. Butt edges and ends tightly to adjacent boards and to protrusions.
 - a. Place a continuous bead of adhesive between boards
- C. Extend boards over expansion joints, unbonded to wall on one side of joint.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- E. Place 6 inch wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames, and tape seal in place to ensure continuity of vapor retarder and air seal.
- F. Tape insulation board joints and protrusion or interruptions to the insulation plane
 - 1. Ensure insulation board surfaces are clean, free of dust and dry prior to applying joint tape.
 - 2. Apply joint tape over exposed board joints using a squeegee or bristle brush. Ensure tape adheres to embossed surface.

3.04 BOARD INSTALLATION AT CAVITY WALLS

- A. Install in accordance to manufacturer's recommendations
- B. Adhere a 6 inch wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
 - 1. Tape seal joints between sheets.
 - 2. Extend sheet full height of joint.
- C. Apply adhesive to back of boards:
 - 1. Three continuous beads per board length.
- D. Install boards to fit snugly between wall ties.
 - 1. Place membrane surface against adhesive.
- E. Install boards vertically on walls.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.
 - 3. Butt edges and ends tightly to adjacent boards and to protrusions.
 - a. Place a continuous bead of adhesive between boards
- F. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- G. Tape insulation board joints and protrusions or interruptions to the insulation plane to maintain continuity of air barrier.
 - 1. Ensure insulation board surfaces are clean, free of dust and dry prior to applying joint tape.
 - 2. Apply joint tape over exposed board joints using a squeegee or bristle brush. Ensure tape adheres to embossed surface.
- H. Joint Sealant: For joints, gaps, and openings less than ½ inch (13 mm) wide, install continuous bead of joint sealant. Provide backer rod as required to prohibit joint sealant from bonding to a third surface.
- I. Expanding Foam Sealant: For joints, gaps, and openings greater than ½ inch (13 mm) wide, install sealant in a continuous ribbon between adjacent board edges, working sealant in to joint for a full depth bead of sealant.
- J. Place 6 inch wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames, and tape seal in place to ensure continuity of vapor retarder and air seal.

3.05 BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.06 FOAM INSTALLATION

- A. Apply foam insulation in accordance with manufacturer's installation guidelines.
- B. Avoid overfilling restricted spaces.
- C. Apply foam insulation in gaps and cracks up to 1 inch in size.
- D. Apply low pressure foam insulation in gaps and cracks adjacent to door and window frames, up to a maximum gap width of 1 inch.
- E. Clean overspray from adjacent surfaces and ensure a suitable substrate for subsequent work.
- F. Foam insulation required between all windows and doors at head, jamb, and sill

3.07 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

**SECTION 07 21 19
FOAMED-IN-PLACE INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Foamed-in-place insulation at junctions of dissimilar wall and roof materials to achieve a thermal and air seal , with protective overcoat.
- B. Protective intumescent coating.

1.02 RELATED REQUIREMENTS

1.03 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 D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics 2019.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- D. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2004 (Reapproved 2012).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, insulation properties, overcoat properties, and preparation requirements.
- C. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing work of the type specified, with minimum three years documented experience.

1.07 PROJECT CONDITIONS

- A. Sequence work to ensure timely placement of insulation within concealed spaces.

1.08 FIELD CONDITIONS

- A. Do not install insulation when ambient temperature is lower than 60 degrees F.
- B. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, open or closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
 - 1. Regulatory Requirements: Comply with applicable code for flame and smoke, concealment, and overcoat limitations.
 - 2. Insulation: ASTM C 1029, Type I, polyurethane, 15 psi, minimum.

3. Thermal Resistance: R-value of 6.2, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
4. Water Vapor Permeance: Vapor retarder; 2 perms, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
5. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
6. Air Permeance: 0.04 cfm/sq ft, maximum, when tested at intended thickness in accordance with ASTM E2178 or ASTM E283 at 1.57 psf.
7. Closed Cell Content: At least 90 percent.
8. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
9. Manufacturers:
 - a. Covestro, LLC; EcoBay CC: www.covestro.com/sprayfoam/#sle.
 - b. Demilec LLC; HEATLOK HFO High Lift: www.demilec.com/#sle.
 - c. Johns Manville; JM Corbond III Closed Cell Spray Polyurethane Foam: www.jm.com/#sle.
 - d. Icynene Inc; MD-C-200: www.icynene.com.
 - e. NCFI Polyurethanes: www.ncfi.com.
 - f. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACCESSORIES

- A. Primer: As required by insulation manufacturer.
- B. Protective Coating: Intumescent coating of type recommended by insulation manufacturer and as required to comply with applicable codes.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify work within construction spaces or crevices is complete prior to insulation application.
- B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

3.02 PREPARATION

- A. Mask and protect adjacent surfaces from over spray or dusting.
- B. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION

- A. Apply insulation in accordance with manufacturer's instructions.
- B. Apply insulation by spray method, to a uniform monolithic density without voids.
- C. Apply to achieve a thermal resistance R-value of 19 minimum.
- D. Apply overcoat monolithically, without voids to fully cover foam insulation, to achieve fire rating required.
- E. Patch damaged areas.
- F. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.
- G. Trim excess away for applied trim or sheet metal closer trim.

3.04 PROTECTION

- A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

**SECTION 07 21 26
BLOWN INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Ceiling and Attic: Blown insulation pneumatically placed into joist spaces through access holes.

1.02 RELATED REQUIREMENTS

- A. Section 07 21 13 - Board Insulation.

1.03 REFERENCE STANDARDS

- A. ASTM C739 - Standard Specification for Cellulosic Fiber (Wood-Base) Loose-Fill Thermal Insulation 2011.
- B. ASTM C1015 - Standard Practice for Installation of Cellulosic and Mineral Fiber Loose-Fill Thermal Insulation 2006 (Reapproved 2011).

1.04 SYSTEM DESCRIPTION

- A. Materials of This Section: Provide continuity of thermal barrier at building enclosure elements .

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and limitations.
- C. Certificates: Certify that products of this section meet or exceed specified requirements.

1.06 PROJECT CONDITIONS

- A. Coordinate the work with Section 07 2100 for placement of insulation materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Blown Insulation:
 - 1. GreenFiber: www.greenfiber.com.
 - 2. International Cellulose Corp.
 - 3. Applegate Insulation
 - 4. Energy Control Insulation: www.energycontrolcellulose.com
 - 5. Advanced Fiber Technology: www.advanced-fiber.com.

2.02 MATERIALS

- A. Applications: Provide blown insulation in attic and ceiling as indicated on drawings.
- B. Blown Insulation: ASTM C739, cellulosic fiber type, nodulated for pour and bulk for pneumatic placement.
 - 1. Chemically treated for fire resistance
 - 2. Installed Thickness: As indicated on drawings.
- C. Ventilation Baffles (stops): Formed plastic.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate and adjacent materials are dry and ready to receive insulation.
- B. Verify that light fixtures have thermal cut-out device to restrict over-heating in soffit or ceiling spaces.
- C. Verify spaces are unobstructed to allow for proper placement of insulation.

3.02 INSTALLATION

- A. Install insulation and ventilation baffle in accordance with ASTM C1015 and manufacturer's instructions.
- B. Place insulation pneumatically to completely fill joist and rafter spaces.
- C. Place insulation against baffles, and do not impede natural attic ventilation to soffit.
- D. Place against and behind mechanical and electrical services within the plane of insulation.
- E. Completely fill intended spaces leaving no gaps or voids.
- F. Repair and reseal insulation access ports, and refinish to match adjacent work.

3.03 CLEANING

- A. Remove loose insulation residue.

3.04 SCHEDULES

- A. Attic Spaces: Place insulation between ceiling joists to achieve an R value of 19.

END OF SECTION

**SECTION 07 31 13
ASPHALT SHINGLES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Asphalt shingle roofing.
- B. Flexible sheet membranes for eave protection, underlayment, and valley protection.
- C. Associated metal flashings and accessories.
- D. Nailable Cross Ventilation
- E. Hip & Ridge end caps
- F. Ridge Cap
- G. Mid Span Venting
- H. Tapered vent end caps

1.02 RELATED REQUIREMENTS

- A. Section 06100 - Rough Carpentry: Roof sheathing and framed openings.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Edge and cap flashings.
- C. Section 07 71 23 - Manufactured Gutters and Downspouts.
- D. Section 07 72 00 - Roof Accessories

1.03 REFERENCE STANDARDS

- A. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing 2017.
- B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2021.
- C. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules 2019.
- D. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).
- E. ASTM D6380/D6380M - Standard Specification for Asphalt Roll Roofing (Organic Felt) 2003 (Reapproved 2018).
- F. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings 2020a.
- G. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples 2021.
- H. NRCA (RM) - The NRCA Roofing Manual 2022.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating material characteristics.
- C. Shop Drawings: For metal flashings, indicate specially configured metal flashings.
- D. Samples: Submit two samples of each shingle color indicating color range and finish texture/pattern ; for color selection.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with the recommendations of manufacturer.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents
- C. Manufacturer Roof Warranty: Shingle manufacturer shall provide a prorated limited labor and material warranty.
 - 1. Warranty Period: Lifetime (50 years) from the date of Substantial Completion
 - 2. Provide 10 year non-prorated with the remaining 40 years prorated.
 - 3. Provide 5 year 110 MPH wind speed warranty
 - 4. Algae Resistant Warranty: 15 Years
- D. Roofing Contractor Warranty: The roofing contractor will guarantee, from the date of Substantial Completion, at his cost and expense make or cause to make such repairs to the roof resulting from faults or defects in material or workmanship as necessary to maintain the roof in a watertight condition. Guarantee shall include, but is not limited, shingles, flashing, roof insulation, and fasteners. (Copy of Warranty is included at the end of this Section.)
 - 1. Guarantee shall include, but is not limited, roof membrane, flashing, roof insulation, fasteners, walkways, and roof expansion joints.
 - 2. Warranty Period: 2 Years from the date of Substantial Completion
 - 3. Repairs required, either permanent or temporary, to the roofing or roof flashing under this guarantee shall be made within 3 days after notice of the need for repair. Should the contractor fail to make such repairs within the time period, the Owner may have the repairs made and the cost to the Contractor.

1.07 FIELD CONDITIONS

- A. Do not install shingles or eave protection membrane when surface temperatures are below 45 degrees F.

1.08 EXTRA MATERIALS

- A. See Section 01 6000 - Product Requirements, for additional provisions.
- B. Provide 100 sq ft of extra shingles of each color specified.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer:
 - 1. Certaineed: Landmark Pro: www.certaineed.com
- B. Asphalt Shingles:
 - 1. Atlas Roofing Corporation: www.atlasroofing.com.
 - 2. GAF Materials Corporation: www.gaf.com.
 - 3. Owens Corning Corp: www.owenscorning.com/#sle.
 - 4. Tamko, Elite
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ASPHALT SHINGLES

- A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462/D3462M.
 - 1. Fire Resistance: Class A, complying with ASTM E108.
 - 2. Weight: 300 lb/100 sq ft.
 - 3. Self-sealing type.
 - 4. Style: Square.
 - 5. Color: Color to match existing shelter house roof on same site.

2.03 SHEET MATERIALS

- A. Smooth Surfaced Roll Roofing: Asphalt-coated organic felt, with smooth asphalt coating both sides, complying with ASTM D6380/D6380M, Class S, Type III, 51.1 lb/100 sq ft.
- B. Eave Protection Membrane: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
- C. Underlayment: Asphalt-saturated organic roofing felt, unperforated, complying with ASTM D226/D226M, Type I ("No.15").
- D. Flexible Flashing: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.

2.04 ACCESSORIES

- A. Roofing Nails: Standard round wire shingle type, galvanized steel, aluminum roofing nails, or copper roofing nails, minimum 3/8 inch head diameter, 12 gage, 0.109 inch nail shank diameter, 1-1/2 inch long and complying with ASTM F1667.
- B. Plastic Cement: ASTM D4586/D4586M, asphalt roof cement.
- C. Ridge Vents:
 - 1. Product: Shingle Vent II, manufactured by Air Vent Inc., www.airvent.com
 - a. Acceptable Manufacturers:
 - 1) Tamlyn; www.tamlyn.com
 - 2) Everflo Vent; www.everflo.com
 - 3) Substitutions: See Section 01 6000 - Product Requirements.
 - 2. High impact copolymer shingle-over ridge vent with external baffle and internal weather filter or optimum airflow and weather protection.
 - 3. Width: 12 inches
 - 4. Color: As selected by architect from manufacturer full line of standard colors.

2.05 MISC. METAL FLASHINGS

- A. Metal Flashings: Provide sheet metal eave edge, gable edge, open valley flashing, and other flashing indicated.
 - 1. Form flashings to profiles indicated on drawings.
 - 2. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
 - 3. Hem exposed edges of flashings minimum 1/4 inch on underside.
 - 4. Coat concealed surfaces of flashings with bituminous paint.
- B. Aluminum Sheet Metal: Prefinished aluminum, 26 gage, 0.017 inch minimum thickness; PVC coating, manufacturers standard color.
- C. Bituminous Paint: Acid and alkali resistant type; black color.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.
- B. Verify that roof deck is of sufficient thickness to accept fasteners.
- C. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.
- D. Verify roof openings are correctly framed.
- E. Verify deck surfaces are dry, free of ridges, warps, or voids.

3.02 PREPARATION

- A. Seal roof deck joints wider than 1/16 inch as recommended by shingle manufacturer.

- B. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.
- C. Broom clean deck surfaces before installing underlayment or eave protection.
- D. Install eave edge flashings tight with fascia boards, weather lap joints 2 inches and seal with plastic cement, and secure flange with nails spaced 6 inches on center.

3.03 INSTALLATION - EAVE PROTECTION MEMBRANE

- A. Install eave protection membrane from eave edge to minimum 4 ft up-slope beyond interior face of exterior wall.
- B. Install eave protection membrane in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.

3.04 INSTALLATION - UNDERLAYMENT

- A. Underlayment At Roof Slopes Up to 4:12: Install two layers of underlayment over area not protected by eave protection, with ends and edges weather lapped minimum 4 inches, stagger end laps of each consecutive layer, and nail in place.
- B. Underlayment At Roof Slopes Greater Than 4:12: Install underlayment perpendicular to slope of roof, with ends and edges weather lapped minimum 4 inches, stagger end laps of each consecutive layer, nail in place, and weather lap minimum 4 inches over eave protection.
- C. Weather lap and seal watertight with plastic cement any items projecting through or mounted on roof.

3.05 INSTALLATION - VALLEY PROTECTION

- A. Install one ply of smooth surfaced roll roofing, minimum 18 inches wide, centered over valleys.
- B. Install flexible flashing in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- C. Weather lap joints minimum 2 inches.
- D. Nail in place minimum 18 inches on center, 1 inch from edges.
- E. At Exposed Valleys: Install one layer of sheet metal flashing, minimum 24 inches wide, centered over open valley and crimped to guide water flow, weather lap joints minimum 2 inch wide band of lap cement along each edge of first layer, press roll roofing into cement, nail in place minimum 18 inches on center and 1 inch from edges.

3.06 INSTALLATION - METAL FLASHING AND ACCESSORIES

- A. Install flashings in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Weather lap joints minimum 2 inches and seal weather tight with plastic cement.
- C. Items Projecting Through or Mounted on Roofing: Flash and seal weather tight with plastic cement.

3.07 INSTALLATION - SHINGLES

- A. Install shingles in accordance with manufacturer's instructions manufacturer's instructions and NRCA (RM) applicable requirements.
 - 1. Fasten individual shingles using two nails per shingle, or as required by manufacturer and local building code, whichever is greater.
 - 2. Fasten strip shingles using four nails per strip, or as required by manufacturer and local building code, whichever is greater.
- B. Place shingles in straight coursing pattern with 5 inch weather exposure to produce double thickness over full roof area, and provide double course of shingles at eaves.
- C. Project first course of shingles 3/4 inch beyond fascia boards.

- D. Extend shingles 1/2 inch beyond face of gable edge fascia boards.
- E. Cap hips with individual shingles, maintaining 5 inch weather exposure, and place to avoid exposed nails.
- F. After installation, place one daub of plastic cement, one inch diameter under each individual shingle tab exposed to weather, to prevent lifting.
- G. Coordinate installation of roof mounted components or work projecting through roof with weather tight placement of counter flashings.
- H. Complete installation to provide weather tight service.

3.08 PROTECTION

- A. Do not permit traffic over finished roof surface.

END OF SECTION

**SECTION 07 62 00
SHEET METAL FLASHING AND TRIM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, exterior penetrations, soffit and related trims, and other items indicated in Schedule.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood nailers for sheet metal work.
- B. Section 07 71 00 - Roof Specialties: Manufactured copings, flashings, and expansion joint covers.
- C. Section 07 71 23 - Manufactured Gutters and Downspouts.
- D. Section 07 92 00 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

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 2020.
- B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- D. CDA A4050 - Copper in Architecture - Handbook current edition.
- E. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

1.08 WARRANTY

- A. Provide a 30 year warranty for manufacturer approved 70 percent Kynar colors for the painted finish covering color fade, chalk, and film integrity.

PART 2 PRODUCTS

2.01 PREFABRICATED REGLETS AND COUNTERFLASHING

- A. Manufacturer:
 - 1. Metal Era, Waukesha, Wisconsin:

2. Acceptable Manufacturers:
 - a. MM Systems Company, Tucker, Georgia
 - b. W.P. Hickman, Asheville, North Carolina
 - c. Architectural Products Co
 - d. Substitutions: See Section 01 6000 - Product Requirements
- B. Product; Two Piece Counterflashing Reglet version
 1. Material: 0.050 Aluminum
 2. Finish: Kynar 500, fluoropolymer coating
 3. Height: 5 5/8 inches with 3 inch factory endlaps
 4. Accessories: Factory mitered and sealed corners.

2.02 PREFABRICATED FASCIA (ROOF EDGE)

- A. Manufacturer:
 1. Metal Era, Waukesha, Wisconsin:
 2. Acceptable Manufacturers:
 - a. MM Systems Company, Tucker, Georgia
 - b. W.P. Hickman, Asheville, North Carolina
 - c. Substitutions: See Section 01 6000 - Product Requirements
- B. Anchor-Tite: Decorative metal fascia with continuous extruded aluminum bar. The system shall be watertight with no exposed fasteners. Model shall be: ABF-80. The rise above the nailer 2".
 1. Extruded bar shall lock membrane, prevent wind pullback.
 2. Injection molded EPDM splices to allow thermal expansion of extruded aluminum anchor bar.
 3. Fascia shall freely thermal cycle on extruded bar, preventing periodic maintenance.
- C. Fascia metal gauge: .040" thick formed aluminum with Kynar 500 finish.
 1. Color to be selected by the Architect from manufacturer's standards
- D. Fascia: standard 12'-0" (3.65 m) lengths.
- E. Extruded bar: Shall be continuous 6063-T6 alloy aluminum at 12'-0" (3.65 m) standard lengths. All bar miters are welded.
- F. Fasteners: # 9 x 2" stainless steel fasteners provided with drivers. No exposed fasteners permitted.
- G. Exterior fascia finishes: Kynar 500 from manufacturer's standard colors.
- H. Accessories:
 1. Miters, downspout scuppers, spillout scuppers shall be fabricated by manufacturer.
 2. Welded base assembly shall be used to maintain watertight integrity.
 3. Provide matching brick wall cap, downspout, extenders, or other special fabrications as detailed.

2.03 SOFFIT MATERIAL

- A. Dimensional Metal Inc, 58 Kelma Drive, Reynoldsburg, Ohio 43068
 1. Soffit: FP1012 Vented-1 High Bead and FP1012 Non-Vented-1 High Bead
- B. Centria
 1. Soffit: IW-14A Vented and Un-Vented
- C. AEP Span:
 1. Soffit: Prestige-Vented and Un-Vented.
- D. Peterson Pac-Clad
 1. Soffit: Pac 750 Soffit series Vented and Un-Vented
- E. Merchant & Evans Inc.
 1. Soffit: Flush Lock series Vented and Un-Vented

F. Substitutions: No substitutions permitted without express written approval.

2.04 SOFFIT SYSTEM

- A. Soffit panel to be nominal 12 inches wide perforated to allow 7.5% free air with V groove in the middle, conceal fastener leg with concealed fasteners
- B. Sheet Materials: Soffit and related soffit flashing and trim metal
 - 1. Aluminum Sheet: ASTM B 209 (ASTM B 290M) 0.032 inch thick
 - 2. Panel continuous length.
 - 3. Texture: Smooth
 - 4. Finish: Premium fluorocarbon coating - Kynar 500 or Hylar 5000

2.05 ACCESSORIES

- A. Pre-Finished Aluminum: ASTM B 209 (ASTM B 209M); 0.050 inch thick; plain finish shop pre coated with fluoropolymer coating of color as selected.
 - 1. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.
- B. General: Provide trim/flashing, fascias, ridge, valley, closures, gutters, gutter hangers and other related required items to provide a complete system
- C. Fasteners: Same metal as flashing/sheet metal or other noncorrosive metal as recommended by sheet manufacturer. Match finish of exposed fasteners the same as the material being fastened.
- D. Epoxy Seam Sealer: Two (2) part noncorrosive metal seam cementing compound for exterior and interior nonmoving joints.
- E. Metal Accessories: Provide sheet metal flashings, clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed.
- F. Soffit Framing
 - 1. Framing System Components: Meeting requirements of ASTM C 645-08; C-channel, roll-formed from hot dipped galvanized steel; complying with ASTM A 1003 and ASTM A653 G40 or equivalent corrosion resistant coating.
 - 2. Studs: C shaped with flat or formed webs[<>].
 - 3. Furring: Hat-shaped sections, minimum depth of 7/8 inch or as noted on drawings.
- G. Vented soffit trim
 - 1. General: Provide trim/flashing, fascias, ridge, valley, closures, gutters, gutter hangers and other related required items to provide a complete system
 - 2. Color: Surfaces exposed to view to match the color of the soffit.

2.06 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239 inch) thick base metal.
- B. Aluminum: ASTM B209 (ASTM B209M); 20 gage, (0.032 inch) thick; anodized finish of color as selected.

2.07 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.
- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Comply with manufacturers installation instructions, manufacturers recommendations and SMACNA 'Architectural Sheet Metal Manual'
- B. Install in accordance with manufacturer's installation instructions.
- C. Install work with provisions for thermal expansion of flashings, gravel stops, fascia, copings, reglets, and other items exposed for more than 20 feet of continuous length. Maintain as watertight installation at expansion seams.
- D. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- E. Apply plastic cement compound between metal flashings and felt flashings.
- F. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- G. Seal metal joints watertight.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, for field inspection requirements.

END OF SECTION

**SECTION 07 71 23
MANUFACTURED GUTTERS AND DOWNSPOUTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pre-finished galvanized steel gutters and downspouts.

1.02 RELATED REQUIREMENTS

- A. Section 07 31 13 - Asphalt Shingle Roofing
- B. Section 07 62 00 - Sheet Metal Flashing and Trim.

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 2020.
- B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- D. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Comply with SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.
- C. Product Data: Provide data on prefabricated components.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
- B. Prevent contact with materials that could cause discoloration, staining, or damage.

1.07 PROJECT CONDITIONS

- A. Coordinate the work with downspout discharge pipe inlet.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gutters and Downspouts:
 - 1. ATAS International, Inc.
 - 2. Metal Era, Waukesha, Wisconsin:
 - 3. MM Systems Company, Tucker, Georgia
 - 4. W.P. Hickman, Asheville, North Carolina
 - 5. Architectural Products Co
 - 6. Cheney Flashing Company: www.cheneyflashing.com/#sle.
 - 7. SAF Perimeter Systems, a division of Southern Aluminum Finishing Company, Inc: www.saf.com/persys/#sle.
 - 8. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Pre-Finished Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 zinc coating; minimum .07 inch thick base metal.

1. Finish: Shop pre-coated with PVDF (polyvinylidene fluoride) coating.
 2. Color: As indicated.
- B. Pre-Finished Aluminum Sheet: ASTM B209 (ASTM B209M); 0.032 inch thick.
1. Finish: Plain, shop pre-coated with PVDF (polyvinylidene fluoride) coating.
 2. Color: As indicated.

2.03 COMPONENTS

- A. Gutters: SMACNA rectangular style profile.
1. Seal-Tite Industrial Gutter:
 - a. Shape: As shown on the drawings.
 - b. Heavy gauge gutter straps securely support gutter, water, snow, and ice.
 2. Gauge: 22 ga steel
 3. Gutter length: Standard length: minimum of 12 feet
 4. Gutter size: 5" x 4 1/2" or as noted on the drawings.
 5. Finishes: Kynar 500 from manufacturer's standard colors.
- B. Downspouts: SMACNA Rectangular profile. Locations as indicated on the drawings.
1. Standard downspouts:
 - a. Size: 6 x 6 inch, 6 x 4 inch or as shown on the drawings.
 - b. Gauge: 22 ga
 - c. Length: As long as possible with one sheet.
 - d. Location: Typical everywhere unless otherwise noted as Structural.
 2. Structural Steel downspouts shall be 6 " x 4" x 3/16" thick with finish matching roof panel.
 - a. Downspout supports: Bracket, 1/8 inch thick, U shaped with flanges.
- C. Connectors: Furnish required connector pieces for PVC (polyvinyl chloride) components.
- D. Anchors and Supports: Profiled to suit gutters and downspouts.
1. Anchoring Devices: In accordance with CDA requirements.
 2. Gutter Supports: Brackets.
 3. Downspout Supports: Brackets.
- E. Fasteners: Galvanized steel , with soft neoprene washers.

2.04 ACCESSORIES

- A. Corners, end caps, expansion joints shall be fabricated by manufacturer. Factory fabricated, mitered corners shall have 17 1/2 inch nominal leg lengths.
- B. Provide matching ledge caps, downspouts, etc.

2.05 FABRICATION

- A. Form gutters and downspouts of profiles and size indicated.
- B. Fabricate with required connection pieces.
- C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Hem exposed edges of metal.
- E. Fabricate gutter and downspout accessories; seal watertight.

2.06 FINISHES

- A. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.

- B. Verify that surfaces are ready to receive work.

3.02 PREPARATION

- A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Slope gutters 1/8 inch per foot or as required for project.
- C. Connect downspouts to downspout boots at approximately 10 inches above grade. Grout connection watertight.

END OF SECTION

SECTION 07 92 00 JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Provide labor, materials and equipment necessary to complete sealant work, both interior and exterior of the Project.
- B. Nonsag gunnable joint sealants.
- C. Self-leveling pourable joint sealants.
- D. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer 2015 (Reapproved 2022).
- B. ASTM C834 - Standard Specification for Latex Sealants 2017.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2018.
- F. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness 2015 (Reapproved 2021).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with other sections referencing this section.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes 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. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- D. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

1.06 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.

1.07 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and 24 hours after installation of sealants.

- C. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a two (2) year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Joints and intersections in concrete paving.
 - f. Joints and intersections between dissimilar materials that do not fit together with a hairline joint.
 - g. Intersections of equipment that do not fit together or against adjoining material with a hairline joint.
 - h. Other joints indicated below.
 - 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Joints and intersections between dissimilar materials that do not fit together with a hairline joint.
 - c. Intersections of equipment that do not fit together or against adjoining material with a hairline joint.
 - d. Other joints indicated below.
 - 3. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
- B. General Project Recommendations
 - 1. Type 1 - Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
 - 2. Type 2 - Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
 - 3. Type 4 - Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
 - 4. Type 5 - Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
- C. Interior Wet Areas: Bathrooms, restrooms, and food service areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.

2.02 JOINT SEALANTS - GENERAL

- A. Single source responsibility for joint sealers materials: Obtain joint sealer materials from a single manufacturer.
- B. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and experience.

2.03 NONSAG JOINT SEALANTS

- A. Non-Staining 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. Non-Staining To Porous Stone: Non-staining 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. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 - 5. Color: To be selected by Architect from manufacturer's standard range.
 - 6. Service Temperature Range: Minus 20 to 180 degrees F.
 - 7. Applications: Use for:
 - a. Metal to metal joint.
 - b. Glass to glass joints.
 - c. Sheet metal flashing, coping, preformed metal caps, fascia, extenders trim and panels.
 - d. Glass to metal joints.
 - e. Concrete to concrete, including precast panels
 - 8. Manufacturers:
 - a. Dow Chemical Company; DOWSIL 795 Silicone Building Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
 - b. Pecora Corporation; Pecora 864 NST (Non-Staining Technology): www.pecora.com/#sle.
 - c. Sika Corporation; Sikasil WS-290: www.usa-sika.com/#sle.
 - d. Tremco, Inc.; Product Spectrum 2: www.tremcosealants.com.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
 - 1. Color: White or as selected by Architect
 - 2. Applications: Use for:
 - a. Around countertops and backsplashes and other wet interior locations.
 - 3. Manufacturers:
 - a. Dow Corning Corp.; Product Dow Corning 791 Silicone
 - b. Pecora Corporation; Pecora 898 NST (Non-Staining Technology): www.pecora.com/#sle.
 - c. Sika Corporation; Sikasil GP: www.usa-sika.com/#sle.
 - d. Tremco, Inc.; Product Tremsil 200: www.tremcosealants.com.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.
 - 2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
 - 3. Color: To be selected by Architect from manufacturer's standard range.
 - 4. Service Temperature Range: Minus 40 to 180 degrees F.
 - 5. Applications: Use for:

- a. Control, expansion, and soft joints in masonry.
- b. Joints between concrete and other materials.
- c. Joints between metal frames and other materials.
- d. Other exterior joints for which no other sealant is indicated.
- 6. Manufacturers:
 - a. Pecora Corporation; DynaTrol II: www.pecora.com/#sle.
 - b. Pecora Corporation; DynaTrol II General Purpose Two Part Polyurethane Sealant: www.pecora.com.
 - c. Sika Corporation; Sikaflex-1a: www.usa-sika.com/#sle.
 - d. Sika Corporation; Sikaflex-2c NS: www.usa-sika.com/#sle.
 - e. Tremco Global Sealants; Dymonic FC (single component); www.tremcosealants.com
 - f. Tremco Global Sealants; Dymonic 240FC (multi component); www.tremcosealants.com
 - g. BASF Construction Chemicals-Building Systems; Sonolastic NP 1 (single component); www.buildingsystems.basf.com.
 - h. BASF Construction Chemicals-Building Systems; Sonolastic NP 2 (multi component) www.buildingsystems.basf.com.
 - i. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
 - 1. Color: To be selected by Architect from manufacturer's standard range.
 - 2. Grade: ASTM C834; Grade Minus 18 Degrees C (0 Degrees F).
 - 3. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
 - 4. Manufacturers:
 - a. Pecora Corporation; AC-20 +Silicone: www.pecora.com/#sle.
 - b. Tremco Global Sealants: www.tremcosealants.com.; Acrylic Latex 834
 - c. BASF Construction Chemicals-Building Systems; Sonolac: www.buildingsystems.basf.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 SELF-LEVELING SEALANTS

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
 - 1. Movement Capability: Plus and minus 50 percent, minimum.
 - 2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
 - 3. Color: To be selected by Architect from manufacturer's standard range.
 - 4. Service Temperature Range: Minus 40 to 180 degrees F.
 - 5. Applications: Use for:
 - a. Joints in sidewalks and vehicular paving.
 - 6. Manufacturers:
 - a. Pecora Corporation: www.pecora.com/#sle.
 - b. Sika Corporation; Sikaflex-1c SL: www.usa-sika.com/#sle.
 - c. BASF Construction Chemicals-Building Systems; Sonlastic SL 1: www.buildingsystems.basf.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Semi-Rigid Self-Leveling Polyurea Joint Filler: Two-component, 100 percent solids; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.

1. Durometer Hardness, Type A: 75, minimum, after seven days when tested in accordance with ASTM D2240.
2. Color: Concrete gray.
3. Joint Width, Minimum: 1/8 inch.
4. Joint Width, Maximum: 3/4 inch.
5. Joint Depth: Provide product suitable for joints from 1/8 inch to 1 inch in depth excluding space for backer rod.
6. Application: Use for
 - a. Joint filler for concrete slab saw cuts and narrow cracks.
7. Manufacturers:
 - a. Adhesives Technology Corporation; Crackbond JF-311: www.atcepoxy.com/#sle.
 - b. ARDEX Engineered Cements; ARDEX ArdiSeal: www.ardexamericas.com.
 - c. Nox-Crete; DynaFlex JF-85: www.nox-crete.com/#sle.
 - d. Sika Corporation - Sika Loadflex - Load Bearing Semi Rigid Polyurea Joint Filler; www.sika-usa.com.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod 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. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

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.

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.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance 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.

- 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.
- 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. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

END OF SECTION

**SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Thermally insulated hollow metal doors with frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 - Door Hardware.
- B. Section 09 91 13 - Exterior Painting: Field painting.
- C. Section 09 91 23 - Interior Painting: Field painting.
- D. Division 26 - Electrical
- E. Division 27 - Communications
- F. Division 28 - Electronic Safety

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- C. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames 2019.
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100) 2017.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames 2020.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- G. 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 2021a.
- H. 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 2018a.
- I. BHMA A156.115 - Hardware Preparation In Steel Doors And Steel Frames 2016.
- J. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters 2020.
- K. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- L. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; 2000 (ANSI/DHI A115 Series).
- M. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames 2002.
- N. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames 2011.
- O. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2017.
- P. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.
- Q. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- R. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames 2019.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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 any indicated finish requirements.
- D. Samples: Submit two samples of metal, 2 inch by 2 inch in size showing factory finishes, colors, and surface texture.
- E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- F. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
- G. Manufacturer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- B. Maintain at project site copies of reference standards relating to installation of products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or 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.

1.07 PROJECT CONDITIONS

- A. Coordinate the work with door opening construction, door frame and door hardware installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com
 - 2. Curries, an Assa Abloy Group company: www.assaabloydss.com
 - 3. Mesker, dormakaba Group: www.meskeropeningsgroup.com
 - 4. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 - 5. MPI Custom Steel Doors and Frames: www.metalproductsinc.com
 - 6. Steelcraft, an Allegion brand: www.allegion.com
 - 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Tornado-Resistant Hollow Metal Doors and Frames:
 - 1. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Materials
 - 1. Cold Rolled Sheet: ASTM 1008 Commercial Steel Type B suitable for exposed applications
 - a. Application: Interior, unless otherwise noted
- B. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM

- A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
 - a. Steel top cap on exterior doors.
 4. Door Edge Profile: Manufacturers standard for application indicated.
 5. Typical Door Face Sheets: Flush.
 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 door hardware, including cutouts, reinforcing, drilling, and tapping, in accordance with final door hardware and templates provided by hardware supplier. Comply with ANSI A115 Specifications for door and frame preparation".
 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.
- C. 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.
- B. Exterior Doors: Thermally insulated.
 1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless, Epoxy filled edge (Extra Heavy Duty, 16 gauge).
 - a. Level 3 - Extra Heavy-duty.
 - b. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
 - c. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
 2. Core Material: Polyurethane, 1.8 lbs/cu ft minimum density.
 3. Door Thermal Resistance: minimum R-Value of 8.7, minimum, for installed thickness of polyurethane minimum
 4. Door Thickness: 1-3/4 inch, nominal.
 5. Top Closures for Outswinging Doors: Flush with top of faces and edges.
 6. Weatherstripping: Refer to Section 08 71 00.
 7. Verify with Section 08 7100 - Door Hardware, undercut requirements for exterior doors with thresholds. Standard undercut will not be acceptable for low profile handicap thresholds.

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. General:
 1. Comply with the requirements of grade specified for corresponding door, except:
 - a. Frames for interior openings: ANSI A250.8 Level 1 Doors: 16 gage frames.
 - b. Frames for exterior openings: ANSI A250.8 Level 3 Doors: 16 gage frames.
 2. Wall Anchors: Provide metal anchors of shape and size required for the adjoining type of wall construction. Locate anchors on jambs near the top and bottom of each frame and at intermediate points not over 24 inches apart.

3. Floor Anchors: Provide floor clips of 18 gauge steel and fasten to bottom of each jamb member for anchoring frame to floor construction.
4. Fabricate frames with hardware reinforcement plates welded in place.
- C. Exterior Door Frames: Full profile/continuously welded type.
 1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating.
 2. Weatherstripping: Separate, see Section 08 71 00.
- D. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

2.06 ACCESSORIES

2.07 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Factory Finish: Complying with ANSI/SDI A250.3, manufacturer's standard coating.
- C. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

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. Coordinate frame anchor placement with wall construction.
- C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- D. Foam insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- E. Install door hardware as specified in Section 08 71 00.
- F. Coordinate installation of electrical connections to electrical hardware items.
- G. 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 measured with straight edge, corner to corner.

3.05 ADJUSTING AND CLEANING

- A. Adjust for smooth and balanced door movement.

- B. Test sound control doors for force to close, latch, and unlatch; adjust as necessary in compliance with requirements.
- C. Clean and restore soiled surfaces. Remove scraps and debris and leave site in a clean condition.

END OF SECTION

**SECTION 08 71 00
DOOR HARDWARE**

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 Section "Alternates" for alternates affecting this section.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
 - a. "Metal Doors and Frames"
6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
 - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. Door Hardware Schedule:
 - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.

- b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
 - c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.
 - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
5. Key Schedule:
- a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
 - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
 - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

- 1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
- 2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.

D. Closeout Submittals:

- 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Final approved hardware schedule edited to reflect conditions as installed.
 - d. Final keying schedule
 - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
 - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
 - a. Fire door assemblies, in compliance with NFPA 80.
 - b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
 - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
 - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
 - b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
2. Smoke and Draft Control Door Assemblies:
 - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
 - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
3. Electrified Door Hardware

- a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
- 4. Accessibility Requirements:
 - a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.
- C. Pre-Installation Meetings
 - 1. Keying Conference
 - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2) Preliminary key system schematic diagram.
 - 3) Requirements for key control system.
 - 4) Requirements for access control.
 - 5) Address for delivery of keys.
 - 2. Pre-installation Conference
 - a. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Inspect and discuss electrical roughing-in for electrified door hardware.
 - d. Review sequence of operation for each type of electrified door hardware.
 - e. Review required testing, inspecting, and certifying procedures.
 - f. Review questions or concerns related to proper installation and adjustment of door hardware.
 - 3. Electrified Hardware Coordination Conference:
 - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
 - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
 - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
 - a. Mechanical Warranty
 - 1) Locks
 - a) Schlage L Series: 3 years
 - 2) Closers
 - a) LCN 4000 Series: 30 years
 - b. Electrical Warranty
 - 1) Locks
 - a) Schlage: 1 year

1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."
 - 1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.
- B. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.
- C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

- A. Fabrication
 - 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
 - 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 - 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
 - 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.
- C. Cable and Connectors:
 - 1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
 - 2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
 - 3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Ives 3CB series
2. Acceptable Manufacturers and Products:
 - a. Hager AB700/800 series
 - b. McKinney TA314/714 TA386/786 series
 - c. Best CB1900 series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide 3 knuckle, concealed bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
9. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.

2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Hager-Roton
 - b. McKinney

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.

2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin EPT-10
2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.06 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Burns
 - b. Rockwood
 - c. Trimco

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.07 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage L9000 series
2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
7. Provide motor based electrified locksets that comply with the following requirements:
 - a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
 - b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case.
 - c. Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
 - d. Low holding current – maximum 0.01 amps to produce minimal heat, eliminate "hot levers" in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
 - e. Connections – provide quick-connect Molex system standard.
8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
 - a. Vandlgard: Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
 - b. Lever Design: To be selected by Architect.

2.08 OFFLINE CONTROLLER

A. Manufacturer and Product:

1. Scheduled Manufacturer and Product:
 - a. Schlage CTE Engage Controller
2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

1. Provide an offline single opening controller UL 294 listed and compatible with the Schlage Engage Application. Include a multi-technology reader kit.
 2. Provide interfaces for a multi-technology credential reader, powered and dry output relays for strike, alarm, and auxiliary function, and with wireless communication capability.
 3. Provide offline controller with the following power options:
 - a. Power Over Ethernet (POE)
 - 1) .5A at 12 VDC for up to 500 feet.
 - 2) 1.5A at 24 VDC for up to 500 feet.
 - b. 12 VDC in 2A at 12 VDC for up to 500 feet.
 - c. 24 VDC in 2A at 24 VDC for up to 500 feet.
 4. Provide offline controller with the following communication standards:
 - a. Bluetooth low energy version 4.2.
 - b. 2.4 GHz Wi-Fi (IEEE 802.11b/g/n).
 - c. WPA2, WPA, WEP, 802.1x (PEAP).
 - d. Transport Layer Security (TLS) version 12.
 - e. Advanced Encryption Standard (AES) 256-bit.
 5. Provide offline controller with the following signal inputs:
 - a. One Schlage MT11-485 or MT15-485 reader.
 - b. Request to Enter (REN).
 - c. Request to Exit (REX).
 - d. Remote Release – hardwired.
 - e. Door Position Switch (DPS).
 - f. Reader tamper (TAMP).
 6. Provide offline controller with the following signal outputs:
 - a. Card Reader 0.3A at 12 VDC for up to 500 feet.
 - b. Locking mechanism: 2A at 30 VDC max.
 - c. Auxiliary: 2A at 30 VDC max.
 - d. Alarm: 2A at 30 VDC max.
 7. Provide offline controller with the following with operating temperatures between -31 F (-35 C) to 151 F (66 C).
 8. Provide offline controller with the following on board database:
 - a. up to 5,000 users
 - b. up to 2,000 audits (FIFO)
 - c. up to 16 Time Zones
 - d. up to 32 Holiday Schedules
 - e. up to 16 Schedules (lock & unlock)
 9. Provide offline controller with the following connectivity options:
 - a. Apple or Droid smart phone – Bluetooth updates to CTE.
 - b. Wi-Fi access point – automatic daily updates (one time per day) if connected to Wi-Fi.
- C. Provide offline controller with "No-Tour" with MT20W enrollment reader and Schlage 1K smart credentials (13.56 MHz).

2.09 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage/Von Duprin PS900 Series
2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
 - a. 12/24 VDC Output, field selectable.
 - b. Class 2 Rated power limited output.
 - c. Universal 120-240 VAC input.
 - d. Low voltage DC, regulated and filtered.
 - e. Polarized connector for distribution boards.
 - f. Fused primary input.
 - g. AC input and DC output monitoring circuit w/LED indicators.
 - h. Cover mounted AC Input indication.
 - i. Tested and certified to meet UL294.
 - j. NEMA 1 enclosure.
 - k. Hinged cover w/lock down screws.
 - l. High voltage protective cover.

2.10 CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage Everest 29 T
2. Acceptable Manufacturers and Products:
 - a. No Substitute

B. Requirements:

1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
 - a. Patented Restricted: cylinder with interchangeable core with patented, restricted keyway.
3. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent protected.
4. Nickel silver bottom pins.

2.11 KEYING

A. Scheduled System:

1. New factory registered system:

- a. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Construction Keying:

- a. Replaceable Construction Cores.
 - 1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - a) 3 construction control keys
 - b) 12 construction change (day) keys.
 - 2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2. Permanent Keying:

- a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - 1) Master Keying system as directed by the Owner.
- b. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
- c. Provide keys with the following features:
 - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - 2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
 - 3) Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.
- d. Identification:
 - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
 - 2) Identification stamping provisions must be approved by the Architect and Owner.
 - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
- e. Quantity: Furnish in the following quantities.
 - 1) Change (Day) Keys: 3 per cylinder/core.
 - 2) Permanent Control Keys: 3.
 - 3) Master Keys: 6.

2.12 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:

- a. LCN 4010/4110/4020 series

2. Acceptable Manufacturers and Products:

- a. No Substitute

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.13 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
 - a. Glynn-Johnson
2. Acceptable Manufacturers:
 - a. No Substitute

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

2.14 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Zero International

2. Acceptable Manufacturers:
 - a. No Substitute
- B. Requirements:
 1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
 2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
 4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 2. Custom Steel Doors and Frames: HMMA 831.
 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
 - 1. Install construction cores to secure building and areas during construction period.
 - 2. Replace construction cores with permanent cores as indicated in keying section.
 - 3. Furnish permanent cores to Owner for installation.
- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
 - 1. Conduit, junction boxes and wire pulls.
 - 2. Connections to and from power supplies to electrified hardware.
 - 3. Connections to fire/smoke alarm system and smoke evacuation system.
 - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 - 5. Connections to panel interface modules, controllers, and gateways.
 - 6. Testing and labeling wires with Architect's opening number.
- K. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- L. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- M. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- N. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- O. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- P. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- Q. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- R. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

Abbreviation	Name
GLY	Glynn-Johnson Corp
IVE	H.B. Ives
LCN	LCN Commercial Division
SCE	Schlage Electronic Security
SCH	Schlage Lock Company
VON	Von Duprin
ZER	Zero International Inc

85071 OPT0308381 Version 1

Hardware Set No. 01

For use on mark/door #(s):

A101 A102

Each to have:

1	EA	CONT. HINGE	224HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	EU MORTISE LOCK	L9092TEU 17A RX CON 12/24 VDC	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4011 MC ST-1544	689	LCN
1	EA	MOUNTING PLATE	4020-18 SRT	689	LCN
1	EA	RAIN DRIP	141AA X D.W.	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	DOOR BOTTOM	365AA	AA	ZER
1	EA	THRESHOLD	655A-V3-223	A	ZER
1	EA	WIRE HARNESS	CON-32P		SCH
1	EA	WIRE HARNESS	CON-6W		SCH

DESCRIPTION OF OPERATION;

CTE CONTROLLER WILL RELEASE LEVER TRIM ON TIME OF DAY FUNCTION.

CTE CONTROLLER LISTED IN HARDWARE SET AC. LOCATED IN ROOM 104.

EMERGENCY ACCESS BY MECHANICAL KEY OVERRIDE.

FREE EGRESS AT ALL TIMES.

Hardware Set No. 02

For use on mark/door #(s):

A103

Each to have:

1	EA	CONT. HINGE	224HD EPT	628	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	EU MORTISE LOCK	L9492TEU 17A L583-363 RX DM CON 12/24 VDC	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4011 MC ST-1544	689	LCN
1	EA	MOUNTING PLATE	4020-18 SRT	689	LCN
1	EA	RAIN DRIP	141AA X D.W.	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	DOOR BOTTOM	365AA	AA	ZER
1	EA	THRESHOLD	655A-V3-223	A	ZER
1	EA	WIRE HARNESS	CON-32P		SCH
1	EA	WIRE HARNESS	CON-6W		SCH

DESCRIPTION OF OPERATION;

CTE CONTROLLER WILL RELEASE LEVER TRIM ON TIME OF DAY FUNCTION. THROWING DEADBOLT WILL MOMENTARILY DISABLE TIME OF DAY FUNCTION, UPON EXITING THE ROOM WILL RE-ENGAGE THE TIME OF DAY FUNCTION.

CTE CONTROLLER LISTED IN HARDWARE SET AC. LOCATED IN ROOM 104.

EMERGENCY ACCESS BY MECHANICAL KEY OVERRIDE.

FREE EGRESS AT ALL TIMES.

Hardware Set No. 03

For use on mark/door #(s):

A104

Each to have:

6	EA	HINGE	3CB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	STORERM W/DB	L9480T 17A 09-544	626	SCH
1	EA	FSIC CORE	23-030 CKC EV29 T	626	SCH
2	EA	OH STOP & HOLDER	79H	626	GLY
1	EA	RAIN DRIP	142AA	AA	ZER
1	SET	MEETING STILE	326AA-S	AA	ZER
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	THRESHOLD	65A-V3-223	A	ZER

DOORS REQUIRE SPECIAL 3/8 INCH UNDERCUT FOR ADA TYPE THRESHOLD.

INSTALL PERIMETER WEATHER SEALS BEFORE DOOR HOLDERS AND MOUNTING BRACKETS.

Hardware Set No. AC

For use on mark/door #(s):

AC

Each to have:

1	EA	CONTROLLER	CTE-MTB15-485-B	B	SCE
1	EA	POWER SUPPLY	PS902 BBK 900-2RS 120/240 VAC	LGR	SCE

CTE CONTROLLER AND POWER SUPPLY LOCATED IN ROOM 104

Hardware Set No. MISC

For use on mark/door #(s):

MISC

Each to have:

3	EA	CONST CONTROL KEY	48-056-ICX (ORG)	468	SCH
12	EA	CONST CUT KEY	48-101-ICX (ORG)	468	SCH

END OF SECTION

**SECTION 09 65 13
RESILIENT BASE & ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDE

- A. Resilient Wall Base
- B. Adhesives

1.02 RELATED REQUIREMENTS

1.03 REFERENCED DOCUMENTS

- A. ASTM F 1861 Standard Specification for Resilient Wall base
- B. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
- C. ASTM F 386 Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces
- D. ASTM E 648 Standard Test Method for Critical Radiant Flux of Flooring systems Using a Radiant Energy Source.
- E. ASTM E 662 Test Method for Specific Density of Smoke Generated by Solid Materials.
- F. ASTM F 925 Standard Test Method for Resistance to Chemicals of Resilient Flooring.
- G. ASTM F 137 Standard Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus
- H. ASTM F 1515 Standard Test Method for Measuring Light Stability of Resilient Vinyl Flooring by Color Change
- I. National Fire Protection Association (NFPA): NFPA 255, Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
- J. National Fire Protection Association (NFPA) 258 Test Method for Specific Density of Smoke Generated by Solid Materials.
- K. California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).
- L. The Collaborative for High Performance Schools (CHPS)

1.04 SUBMITTALS

- A. Product Data: Submit product data, including manufacturer's specification summary sheet for specified products
- B. Shop Drawings: Submit shop drawings showing layout, finish colors, patterns and textures.
- C. Samples: Submit selection and verification samples for finishes, colors, and textures.
- D. Quality Assurance Submittals: Submit the following:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 2. Manufacturer's Instructions: Manufacturer's installation and maintenance instructions.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- F. Maintenance Materials: Furnish the following for City of Greenville's use in maintenance of project.
 - 1. See Section 01 60 00, for additional provisions.
 - 2. Extra Wall Base: 25 linear feet of each type and color.
 - 3. Obtain Owner's signature acknowledging receipt of extra stock.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installing work similar to that required for this project.
- B. Regulatory Requirements
 - 1. Fire Performance characteristics: Provide resilient sheet vinyl floor covering with the following fire performance characteristics as determined by testing products in accordance with ASTM method (and) NFPA method) indicated below by a certified testing laboratory or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. ASTM E 648 (NFPA 253), Critical Radiant Flux of Floor Covering Systems: Class 1, > 1.0 W/cm²
 - b. ASTM E 662 (NFPA 258), Specific Optical Density of Smoke Generated by Solid Materials: Passes, <450
 - c. ASTM E 84 (NFPA 255), Surface Burning Characteristics of Building Materials: Class C
- C. Single-Source Responsibility: Obtain resilient wall base and manufacturer's recommended adhesive from a single supplier.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Storage and Protection: Store materials protected from exposure to harmful weather conditions and acclimated to site conditions at temperature and humidity conditions recommended by manufacturer.
- C. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer's standard warranty to repair or replace installation that fails in material and workmanship.
 - 1. Warranty Period: 3 years form the date of Substantial Completion

PART 2 PRODUCTS

2.01 MANUFACTURER:

- A. Roppe Corporation: www.roppe.com
- B. Acceptable Manufacturers:
 - 1. Burke Flooring: www.burkemercer.com.
 - 2. Johnsonite, a Tarkett Company: www.johnsonite.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 RESILIENT WALL BASE

- A. Minimum Requirements:
 - 1. Thickness tolerance: Complies with ASTM F-386
 - 2. Flexibility: Complies with ASTM F-137
 - 3. Resistance to Heat Aging: Complies with ASTM F-1515
 - 4. Resistance to Detergents: Complies with ASTM F-925
 - 5. Resistance to Alkalis: No fading or softening
 - 6. Dimensional Stability: Complies with ASTM F 1861
 - 7. Squareness: 90 degrees +/- 0.5 degrees
- B. Product:

1. Refer to A9, Material Finish Schedule for product information and details.(RB)
2. Roppe Pinnacle Rubber Base
 - a. a. Complies with ASTM F-1861 Type TS (Thermoset Vulcanized Rubber), Group 1 (Solid)
 - b. Contains 10% natural rubber
 - c. Thickness: 1/8" (3.175 mm) nominal
 - d. Color as selected by Architect from manufacturer's standard colors.
 - e. Profile:
 - 1) Standard toe (cove) for resilient installations
 - f. Nominal Height: 4" and 6"
 - g. Lengths: 4 foot sections or rolls (coil)
 - h. Corners
 - 1) Formed by installer on site

2.03 ACCESSORIES

- A. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions are acceptable for installing product in accordance with manufacturer's instructions.
- B. Material Inspection: In accordance with manufacturer's installing requirements, visually inspect materials prior to installing. Material with visual defects shall not be installed.

3.02 PREPARATION

- A. Prepare substrate in accordance with manufacturer's instructions.
- B. Prepare manufacturer's recommended substrates to be smooth, rigid, flat, level, permanently dry, clean and free of foreign materials such as paint, dust, grease, oils, solvent, old adhesive residue, vinyl wall coverings, non-porous surfaces and all other contaminants that may interfere with adhesive bond.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of conditions.
- B. Install in accordance with manufacturer's instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- E. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold.
- F. Install base on solid backing. Bond tightly to wall and floor surfaces.
- G. Install base on casework base. Bond tightly to casework and floor.
- H. Scribe and fit to door frames and other interruptions.
- I. Trowel marks and other imperfections showing through installed base shall be reason to, remove base, sand out trowel marks, remove or correct imperfections and reinstall base.

3.04 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Repair or replace damaged installed products.
- C. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance.

D. Remove construction debris from project site and legally dispose of debris.

END OF SECTION

**SECTION 09 91 13
EXTERIOR PAINTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
- 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, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 09 91 23 - Interior Painting.

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 D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.
- C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.
- D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- E. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- F. SSPC-SP 2 - Hand Tool Cleaning 2018.
- G. SSPC-SP 6 - Commercial Blast Cleaning 2007.
- H. SSPC-SP 13 - Surface Preparation of Concrete 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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(s) product is to be used in; include description of each system.
- C. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

- D. Maintenance Materials: Furnish the following for City of Greenville's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Finish Materials: 1 gallon 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 five years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience and approved by manufacturer.

1.06 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.
- 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 exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

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 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 other products by the same manufacturer is preferred over substitution of products by a different manufacturer.
- B. Paints:
 - 1. Behr Process Corporation: www.behr.com.
 - 2. PPG Paints: www.ppgpaints.com.
 - 3. Pratt & Lambert Paints: www.prattandlambert.com.
 - 4. Sherwin-Williams Company: www.sherwin-williams.com/.
- C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless required 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, 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. 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.

4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.
- B. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including concrete masonry units, primed wood, and primed metal.
1. Two top coats and one coat primer.
 2. Top Coat(s): Exterior Latex; MPI #10, 11, 15, 119, or 214.
 - a. Products:
 - 1) Behr Marquee Exterior Satin Enamel [No. 9450]. (MPI #15)
 - 2) PPG Paints Acry-Shield Max Exterior Latex, 739-10 Series, Satin.
 - 3) Sherwin-Williams Resilience, Satin. (MPI #15)

2.04 PRIMERS

- A. Primers: Provide the primer as required or recommended by manufacturer of top coats.

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. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 2. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

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 mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Masonry:
1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
 2. Prepare surface as recommended by top coat manufacturer.

- G. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 - 2. Prepare surface according to SSPC-SP 2.
- H. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
 - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- I. Exterior Wood / Composite Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied. Back prime concealed surfaces before installation.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.
- C. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- 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.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. 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 09 91 23
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. 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.
- 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 RELATED REQUIREMENTS

- A. Section 09 91 13 - Exterior Painting.

1.03 REFERENCE STANDARDS

- A. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.
- B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- C. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- D. SSPC-SP 6 - Commercial Blast Cleaning 2007.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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(s) product is to be used in; include description of each system.
- C. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

- D. Maintenance Materials: Furnish the following for City of Greenville's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Finish Materials: 1 gallon 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 five years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years documented experience.

1.06 MOCK-UP

- A. See Section 01 43 00 - Quality Assurance, for general requirements for mock-up.
- B. Mock-up may remain as part of the work.

1.07 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 and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 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 above the dew point, or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candles 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 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 other products by the same manufacturer is preferred over substitution of products by a different manufacturer.
- B. Paints:
 - 1. Behr Process Corporation: www.behr.com/#sle.
 - 2. PPG Paints: www.ppgpaints.com/#sle.

3. Pratt & Lambert Paints: www.prattandlambert.com/#sle.
 4. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
 5. Valspar Corporation: www.valsparpaint.com/#sle.
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
1. 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.
 2. 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.
 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

2.03 FINISHES NOTE

2.04 PAINT SYSTEMS - INTERIOR

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete masonry units, wood, uncoated steel, shop primed steel, and galvanized steel.
- B. Sheen: Eggshell / Satin
1. Two top coats and one coat primer.
 2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
 3. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143, 144, 145, 146, 147, or 148.
 - a. Products:
 - 1) Behr Premium Plus Interior Flat [No. 1050]. (MPI #143)
 - 2) Behr Premium Plus Interior Satin Enamel [No. 7050]. (MPI #146)
 - 3) Behr Premium Plus Interior Semi-Gloss Enamel [No. 3050]. (MPI #147)
 - 4) PPG Paints Speedhide Zero Interior Latex, 6-4110XI Series, Flat. (MPI #143)
 - 5) PPG Paints Speedhide Zero Interior Latex, 6-4310XI Series, Eggshell.
 - 6) PPG Paints Speedhide Zero Interior Latex, 6-4510XI Series, Semi-Gloss. (MPI #147)
 - 7) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Flat.
 - 8) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Low Sheen. (MPI #144)
 - 9) Sherwin-Williams ProMar 200 Zero VOC Interior Latex, Semi-Gloss.
 4. 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 all locations unless otherwise noted.
- C. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
1. Medium duty applications include doors, door frames, railings, handrails, and guardrails.
 2. Sheen: Semi-gloss
 3. Two top coats and one coat primer.

4. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
 - a. Products:
 - 1) Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy, Semi-Gloss. (MPI #141)
 - 2) Substitutions: Section 01 60 00 - Product Requirements.
5. Top Coat(s): Interior Light Industrial Coating, Water Based; MPI #151, 153 or 154.
 - a. Products:
 - 1) PPG Paints Pitt-Tech Plus WB DTM Industrial Enamel, 90-1310 Series, Gloss. (MPI #154)
 - 2) Rodda EcoLogic Waterbased Gloss Enamel, 70603. (MPI #154)
 - 3) Sherwin-Williams Pro Industrial Acrylic Coating, Semi-Gloss. (MPI #153)
 - 4) Substitutions: Section 01 60 00 - Product Requirements.
6. Top Coat Sheen:
 - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations unless otherwise noted.
7. Primer: As recommended by top coat manufacturer for specific substrate.
8. Top Coat(s): Interior Light Industrial Coating, Water Based; MPI #151, 153, or 154.
 - a. Products:
 - 1) PPG Paints Pitt-Tech Plus WB DTM Industrial Enamel, 90-1310 Series, Gloss. (MPI #154)
 - 2) Rodda EcoLogic Waterbased Gloss Enamel, 70603. (MPI #154)
 - 3) Sherwin-Williams Pro Industrial Acrylic Coating, Gloss. (MPI #154)
 - 4) Substitutions: Section 01 60 00 - Product Requirements.
9. Top Coat Sheen:
 - a. Gloss: MPI gloss level 6; use this sheen at all locations unless otherwise noted.
10. Primer: As recommended by top coat manufacturer for specific substrate.
- D. Paint I-OP-DF - Dry Fall: Metals; exposed structure and overhead-mounted services located in areas that have no ceilings, and all ceiling materials are intended to be exposed to view, including shop primed steel deck, structural steel, metal fabrications, galvanized ducts, galvanized conduit, and galvanized piping.
 1. Prime materials as required by finish coat manufacturer.
 2. Top coat: It is the responsibility of the painting contractor to ensure that all materials are properly covered. If a second coat is required, that will be determined by the Architect upon completion of the first coat.
 3. Top Coat: Latex Dry Fall; MPI #118, 155, or 226.
 - a. Products:
 - 1) PPG Paints Speedhide Super Tech Water Based Interior Dry-Fog Latex, 6-724XI, Eggshell. (MPI #155)
 - 2) Sherwin-Williams Waterborne Acrylic Dryfall, Eg-Shel. (MPI #155, 226)
 - 3) Substitutions: Section 01 60 00 - Product Requirements.
- E. Paint I-TR -W - Transparent Finish on Wood.
 1. Stain: Semi-Transparent Stain for Wood; MPI #90.
 2. Top Coat(s): Polyurethane Varnish, Oil Modified; MPI #56 or 57.
- F. Paint WI-OP-3L - Wood, Opaque, Latex, 3 Coat:
 1. One coat of latex primer sealer.
 2. Semi-gloss: Two coats of latex enamel.

2.05 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) PPG Paints: 6-15XI Speedhide Masonry Hi Fill Latex Block Filler. (MPI #4)
- 3) Sherwin-Williams ConFlex Block Filler. (MPI #4)
- 4) Substitutions: Section 01 60 00 - Product Requirements.

2.06 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. Test shop-applied primer for compatibility with subsequent cover materials.
- E. 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. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

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 mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Masonry:
- F. Galvanized Surfaces:
- G. Ferrous Metal:
 1. Solvent clean according to SSPC-SP 1.
 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- H. 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.
- I. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

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. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Sand wood and metal surfaces lightly between coats to achieve required finish.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. 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 10 21 13.13
METAL TOILET COMPARTMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal toilet compartments.
- B. Urinal screens.
- C. Shower compartments.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing: Concealed steel support members.
- B. Section 05 50 00 - Metal Fabrications: Concealed steel support members.
- C. Section 06 10 00 - Rough Carpentry: Blocking and supports.
- D. Section 10 28 00 - Toilet Accessories.

1.03 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- C. Product Data: Provide data on panel construction, hardware, and accessories.
- D. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Toilet Compartments:
 - 1. General Partitions Mfg. Corp; []: www.generalpartitions.com/#sle.
 - 2. Global Steel Products Corp; []: www.globalpartitions.com/#sle.
 - 3. Metpar Corp; []: www.metpar.com/#sle.
 - 4. Sanymetal, A Crane Plumbing Company: www.sanymetal.com.
 - 5. Substitutions: Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Stainless Steel Sheet: ASTM A666, Type 304.

2.03 COMPONENTS

- A. Toilet Compartments: Powder coated steel, floor-mounted unbraced.
- B. Toilet Compartments: Stainless steel, floor-mounted unbraced.
- C. Doors, Panels, and Pilasters: Sheet steel faces, pressure bonded to sound deadening core, formed and closed edges; corners made with corner clips or mitered, welded, and ground smooth.
 - 1. Panel Faces: 20 gage, 0.0359 inch.
 - 2. Door Faces: 22 gage, 0.0299 inch.
 - 3. Pilaster Faces: 20 gage, 0.0359 inch.
 - 4. Reinforcement: 12 gage, 0.1046 inch.
 - 5. Internal Reinforcement: Provide in areas of attached hardware and fittings. Mark locations of reinforcement for partition mounted washroom accessories.

- D. Door and Panel Dimensions:
 - 1. Thickness: 1 inch.
 - 2. Width: Door size of standard stall
 - a. 24" for 5'-0" inswing stall
 - b. 30" for 6'-0" inswing stall
 - c. 30" for outswing stall
 - 3. Door Width for Handicapped Use: 36 inch , out-swinging.
 - 4. Height: 58 inch. (nominal - manufacturers standard height)
- E. Pilasters: 1-1/4 inch thick, of sizes required to suit compartment width and spacing.
- F. Urinal Screens: Wall mounted with two panel brackets, and floor-to-ceiling vertical upright consisting of pilaster anchored to floor and ceiling.

2.04 ACCESSORIES

- A. Pilaster Shoes: Formed chromed steel with polished finish, 3 inch high, concealing floor fastenings.
 - 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Head Rails: Hollow chrome-plated steel tube, 1 by 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.
- C. Brackets: Polished chrome-plated non-ferrous cast metal.
- D. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.
 - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts ; tamper proof.
- E. Hardware: Polished chrome plated non-ferrous cast metal:
 - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
 - 2. Thumb turn or sliding door latch with exterior emergency access feature.
 - 3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
 - 4. Coat hook with rubber bumper; one per compartment, mounted on door.
 - 5. Provide door pull for outswinging doors.

2.05 FINISHING

- A. Powder Coated Steel Compartments: Clean, degrease, and neutralize. Follow immediately with a phosphatizing treatment, prime coat and two finish coats powder coat enamel.
- B. Stainless Steel Compartments: No. 4 finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that field measurements are as indicated.
- C. Verify correct spacing of and between plumbing fixtures.
- D. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

**SECTION 10 28 00
TOILET ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Accessories for toilet rooms.
- C. Electric hand/hair dryers.
- D. Grab bars.
- E. Installation of accessories supplied by owner.

1.02 RELATED REQUIREMENTS

- A. Section 10 21 13.19 - Plastic Toilet Compartments.

1.03 REFERENCE STANDARDS

- A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service 2015a (Reapproved 2019).
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

- A. See Section 01 30 00 - 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.
- D. Maintenance Materials: Furnish the following for City of Greenville's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Keys: Master keys to lockable accessories
 - 3. Liners: Extra baby changing station liners.
 - 4. Obtain Owner's signature acknowledging receipt of extra stock.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Bobrick Washroom Equipment Inc..
- B. Commercial Toilet, Shower, and Bath Accessories:
 - 1. AJW Architectural Products: www.ajw.com/#sle.
 - 2. American Specialties, Inc: www.americanspecialties.com/#sle.
 - 3. Bradley Corporation: www.bradleycorp.com/#sle.
 - 4. Georgia-Pacific Professional: www.blue-connect.com/#sle.
 - 5. Substitutions: Section 01 60 00 - Product Requirements.
- C. Electric Hand/Hair Dryers:
- D. Provide products of each category type by single manufacturer.

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. Provide vandal-resistant fasteners and anchors
 2. Grind welded joints smooth.
 3. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
- B. Keys: Provide 1 keys for each accessory to City of Greenville; master key lockable accessories.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- E. Mirror Glass: Tempered glass, Type I, Class 1, Quality q2 (ASTM C 1036), with silvering, copper coating, and suitable protective organic coating to copper backing in accordance with GSA CID A-A-3002.
- F. Adhesive: Two component epoxy type, waterproof.
- G. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Powder Coated Steel: Clean, degrease, and neutralize. Follow immediately with a phosphatizing treatment, prime coat and two finish coats powder coat enamel.

2.04 COMMERCIAL TOILET ACCESSORIES

- A. See Toilet Accessory Schedule on the drawings
- B. TA-1; Grab Bars:
1. Stainless steel, nonslip grasping surface finish.
 2. Push/Pull Point Load: 250 pound-force, minimum.
 3. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
 4. Length and Configuration: As indicated on drawings.
 5. Product: B 6806 Series manufactured by Bobrick.
- C. TA-2.; Mirrors:
1. Stainless steel framed, 6 mm thick float glass mirror.
 2. Frame: 3/4 x 3/4 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; No.4 finish.
 3. Size and Configuration: As indicated on drawings.
 4. Product: B 2908 Series manufactured by Bobrick.
- D. TA3.2; Toilet Paper Dispenser
1. Surface-mounted multi-roll toilet tissue dispenser shall be type-304 stainless steel with all-welded construction, including dispensing mechanism, inner housing and cam; exposed surfaces shall have satin finish. Front of toilet tissue dispenser door shall be drawn, one-piece, seamless construction. Door shall equipped with a tumbler lock keyed like other accessories
 2. Unit shall dispense two standard-core toilet tissue rolls up to 5-1/4" (133mm) diameter.
 3. Extra roll shall automatically drop in place when bottom roll is depleted.
 4. Unit shall be equipped with two theft-resistant, heavy-duty, one piece, molded ABS spindles.
 5. Product: B-2888 manufactured by Bobrick.
- E. TA4.1; Sanitary Napkin Disposal Unit:
1. Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
 2. Product: B 254 manufactured by Bobrick.
- F. TA5.1; Soap Dispenser

1. Surface-mounted soap dispenser shall be type-304 stainless steel with satin-finish. Corrosion-resistant valve shall dispense commercially marketed all-purpose hand soaps.
 2. Valve shall be operable with one hand and with less than 5 pounds of force (22.2 N) to comply with barrier-free accessibility guidelines (including ADAAG in the U.S.A.).
 3. Container shall be equipped with a clear acrylic refill-indicator window; a locked, hinged stainless steel lid for top filling; and shall have a capacity of 40-fl oz (1.2-L).
 4. Unit shall have concealed, vandal-resistant mounting.
 5. Product: B 2111 manufactured by Bobrick.
- G. TA8.1; Baby Changing Station: Station shall be high-density polyethylene, surface mounted. Unit shall be equipped with a pneumatic cylinder for controlled opening and closing of bed. Bed shall be secured to back plate with a concealed, full length steel on steel hinge. No hinge structure shall be exposed on interior or exterior surfaces. Unit shall have 11 gauge steel mounting plates with mounting hardware included. Unit shall have Mircorban antimicrobial embedded into plastic material. Bed shall have smooth concave changing area with nylon safety strap and two hooks for bags or purses. Unit shall have built in liner dispenser, universal instruction graphics, and safety messages in six languages and braille.
1. Unit shall have a built-in Liner Dispenser for use with 3-ply chemical free biodegradable bed liners, instructional graphics and safety messages in 4 languages. Provide braille labels. Unit shall be backed by manufacturer's 5-year limited warranty on materials and workmanship and include a provision for replacement caused by vandalism.
 2. Provide one (1) case of bed liners (500 liners per case).
 3. Product: KB 200-1 manufactured by Koala Kare Products a Division of Bobrick
- H. A9.1: Electric Dryers: Traditional fan-in-case type, with downward nozzle.
1. Cover: Stainless steel with brushed finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.
- E. See Section 06 1000 for installation of blocking, reinforcing plates, and concealed anchors in walls.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

- A. Refer to A7.1 Drawing for mounting heights and locations.
- B. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- C. Install accessories with vandal-resistant fasteners.
- D. Install plumb and level, securely and rigidly anchored to substrate.
- E. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

**SECTION 22 05 01
PLUMBING MATERIALS & METHODS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping specialties
- B. Lubrication and packing
- C. Installation requirements common to piping systems and equipment specification sections
- D. Concrete Housekeeping Pads.
- E. Emergency repairs or operation
- F. Provisions for later installations
- G. Final completion
- H. Project Conditions
- I. Quality Assurance
- J. Warranty
- K. Supervision and cooperation
- L. Coordination Drawings
- M. Maintenance and operating manuals
- N. Record drawings

1.02 RELATED REQUIREMENTS

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1 and 2, General Requirements, are included as a part of this Section as though bound herein.
- B. Refer to Division 26, Electrical Specifications, and to the requirements stated therein applicable to the Mechanical Work, where coordination of trades is covered.
- C. The Drawings prepared for this Project are an outline to show where pipes, and apparatus must go in order to harmonize with the building and installations of the various trades. Work must be installed in accordance with the Drawings insofar as possible. Drawings shall be carefully checked during the course of bidding and construction. If discrepancies, errors, or omissions are discovered prior to or during the construction phase, notify the Engineer immediately for interpretation or correction. Take necessary measurements and be responsible for same, including clearances for equipment that is to be furnished. The Architect/Engineer shall reserve the right to make minor location changes of piping and equipment where such adjustments are deemed desirable from an appearance or operational standpoint. Such changes will be anticipated sufficiently in advance to avoid extra work or unduly delay progress on the Project.
- D. The general building drawings shall be used to obtain dimensions and exact locations and as a check with other Contractors to avoid interferences with their Work. Refer to applicable Drawings on branches of the Work where other trades are involved on the Project so that added field work and job delays resulting from conflicts between crafts can be avoided. Piping that is prefabricated before coordinating with the other trades may have to be redone at no additional cost if conflicts are encountered.

1.03 SUMMARY

- A. The Contractor(s) shall provide the labor, materials, equipment, appliances, services and transportation, and perform the operations in connection with the construction and installation of the Work. Work shall be as herein specified and as denoted on the accompanying Drawings.

- B. The Contractor(s) shall arrange and pay for permits and inspections required in connection with the Work. The Contractor shall apply for and pay for meters, regulators, recorders, and gauges required. The Contractor must present to the Owner through the Architect/Engineer, properly signed certificates of final inspection by the governing authorities when they become due and shall not cover up Work until approved by those authorities.
- C. Materials or labor obviously required to fully complete the Work shall be included, even though each item necessarily involved is not specifically mentioned or shown. Such Work and materials shall be furnished and shall be of the same grade or quality as the parts actually specified and shown. Should there be a conflict between the plans and Specifications, the greater quantity and better quality shall be furnished.
- D. Should an overlap of Work between the various trades become evident, the Engineer shall be notified. Such an event shall not relieve the Contractor of the responsibility for the Work called for under his branch of the Specifications until a written clarification or directive is issued concerning the matter.
- E. Related Work by Others
 - 1. Unless otherwise stipulated under a specific Section of this Division, motor disconnects and starters shall be provided as Work under Division 26, Electrical.
 - 2. Electric power wiring shall be included as Work under the electrical wiring section of Division 26, Electrical, except as follows:
 - a. Control wiring regardless of voltage shall be included as Work under specific Sections of Division 22.
 - b. Internal package type wiring as specified under specific Sections of Division 22.
- F. Cutting of water lines, electric conduit, or similar service lines in the course of Work performed under this Section shall be immediately repaired as part of the Work of this Section.

1.04 ALTERNATIVES

- A. See Section 01230 - Alternatives, for product alternatives affecting this section.

1.05 REFERENCE STANDARDS

- A. Standards are described by reference to various associations. These are in addition, but not limited to, to those listed in:
 - 1. ANSI American National Standards Institute
 - 2. ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers
 - 3. ASME American Society of Mechanical Engineers
 - 4. ASPE American Society of Plumbing Engineers
 - 5. AWWA American Water Works Association
 - 6. CISPI Cast Iron Soil Pipe Institute
 - 7. NFPA National Fire Protection Association
 - 8. OSHA Occupational Safety and Health Act
 - 9. SMACNA Sheet Metal and Air Conditioning Contractors National Association
 - 10. UL Underwriters' Laboratories, Inc.
- B. Work shall be in complete accordance with codes, rules, and ordinances, regulations of authorities, bodies, associations, and governments, having proper or legal jurisdiction. Specifically, the following requirements shall be met in their entirety.
 - 1. State and Local Rules, Regulations, Codes, Statutes, and Ordinances
 - 2. Ohio Plumbing Code, 2017 Edition
 - 3. ASHRAE 90.1-2010; Energy Standard for Buildings Except Low Rise Residential Buildings
 - 4. NFPA 70 - National Electrical Code; National Fire Protection Association; 2017 applicable requirements.
 - 5. National Board of Fire Underwriters

6. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 1993 (and Revision 1,2,3).
 7. Other Codes and Standards as specifically noted in each Section of the Specifications.
 8. Americans with Disabilities Act (ADA)
- C. References made to codes and standards, in these Specifications or on the Drawings, shall be taken to mean the latest edition, amendment, or revision of such reference in effect as of the date indicated on the Bid Documents unless otherwise noted.

1.06 SUBMITTALS

- A. Submit capacity requirements, catalog cuts, and illustrations in accordance with requirements of specifications and as required by specific Sections of this Specification.
- B. Shop Drawings shall be prepared by the Contractor or supplier.
 1. Where limited space is available due to the nature of the Work, the requirements for shop and working drawings will apply, and the Contractor is required to prepare complete shop drawings showing the exact disposition of apparatus, equipment, piping, ductwork, and the like, and its relation to the building so there will be no irregularities or interferences. Shop drawings shall be prepared in coordination with other Contractors and other trades.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in City of Greenville's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

- A. Instruments used by the Contractor shall be accurately calibrated and maintained in good working condition.
- B. Products and test instruments used shall be subject to approval of Architect/Engineer.
- C. Products and test instruments used shall be provided by each respective Contractor.
- D. Note that systems involved under this Contract heading shall be in accordance with applicable requirements listed in NFPA Standard 90A.
- E. Materials used in this Contract shall be those specified herein unless proposals for the use of alternate materials have been submitted and accepted in writing, as provided hereinbefore. Materials shall be strictly first grade of their kind and shall be new and in first-class condition when installed. Damaged materials will be rejected and must be replaced by proper and acceptable materials. Materials shall be similar and in accordance with the provisions of this Specification.
- F. No materials or equipment may be installed under this contract heading which do not meet the approval of the authorities having jurisdiction. Specific materials may have certain restrictions or exclusions as to their usage, including where they may not be located. Such regulations shall be adhered to where applicable. The requirements and regulations of the local and state building codes and regulations currently adopted shall be adhered to.
- G. Piping systems shall be installed by workmen having skills acquired by working at the trade which is recognized as necessary for competency.

1.08 PROJECT CONDITIONS

- A. Unless otherwise stipulated under a particular heading, the following rules relative to responsibilities of the several Contractors and subcontractors will apply.
 1. Each Contractor shall install roughing-in work pertaining to his trade for connection of Work performed under other Sections of these Specifications.
- B. Certain areas will be designated for the storage of materials and equipment and cooperation with the Owner in minimizing interference with existing operations will be mandatory.
 1. Where possible, store materials inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping.

2. Follow manufacturer's instructions for receiving, inspecting, handling, storage, and protection of products prior to final installation
- C. Equipment Clearances and Requirements
 1. For many items of equipment described in these Specifications, several manufacturers are listed. The manufacturer listed on the drawings is the make on which the layout was based and on which clearances, service required electrical, and plumbing characteristics, etc., have been checked. Additional manufacturers listed are considered acceptable.
 2. Due to the possibility of restrictions imposed by space limitations, the responsibility for resolving conflicts resulting from the use of equipment other than first named shall rest with the equipment supplier and the Contractor. Submittals for this equipment will be considered as a statement that clearances for access, service, maintenance, etc., have been checked and found adequate.
 3. Alternate equipment or the equipment of additional manufacturers named in these documents shall meet Base Bid Specifications. In the event such equipment or any equipment which the bidder proposes to furnish, deviates from the requirements of equipment first named regarding electric service, power wiring, control wiring, plumbing or piping, sound attenuation, or vibration damping, it shall be the responsibility of the bidder to include in his price a sufficient sum to cover additional costs or charges resulting therefrom.
- D. In general, the piping shown on the Drawings shall be considered as diagrammatic for clearness in indicating the general run and connections required, and may not be shown in its true position. The piping and equipment may have to be offset, lowered or raised, as required, or as directed at the site in order to accommodate field conditions.

1.09 SUPERVISION AND COOPERATION

- A. Work done by the Contractor under this Division shall include the services of an experienced superintendent, who shall be constantly in charge of the work, together with the qualified journeymen, helpers, and laborers required to properly unload, install, connect, adjust, start, and operate, and test the Work involved, including related equipment and materials furnished under other contracts or by the Owner.
- B. A Pre-Installation meeting shall convene one week before starting work of this section.

1.10 WARRANTY

- A. See Section 01 7000 - Closeout Procedures, for additional warranty requirements.
- B. Correct defective Work within a one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide motors and starter/disconnect switches having the voltage and electrical characteristics of the service available and where denoted on Drawings or as required.
 1. All motors shall be high efficiency type.

2.02 ESCUTCHEONS AND PLATES

- A. Provide approved plates around each pipe passing through walls, floors, partitions, and ceilings when piping is exposed to view and on exterior of building. Plates shall be chrome-plated metal and sized to cover exposed ends of pipe insulation and pipe sleeves.
- B. Floor plates shall be split-type, heavy chrome-plated and securely attached to the pipe.

2.03 PIPE SLEEVES

- A. Steel pipe sleeves shall be fabricated from Schedule 40 galvanized steel pipe.
- B. Sleeves for copper piping shall be of compatible material to prevent interaction of piping materials.

PART 3 EXECUTION

3.01 INSTALLATION

A. Cutting and Patching

1. Cutting and drilling of walls, slabs, and structural members, required in conjunction with Work under this Section, shall be done under the supervision of the Architect/Engineer. Work shall be neatly done, removing no unnecessary material. Holes, openings, etc., shall be located where they will not weaken the structure. No beams, joists, etc., shall be cut without the written consent of the Architect/Engineer.
2. Cutting of holes in masonry and concrete shall be performed with a core drill to minimize spalling, and limit damage to wall. Locations shall be accurately determined and checked, and the appropriate drill bit shall be used to minimize hole size.
3. Sleeves or thimbles for holes as well as escutcheons and trim plates shall be provided. Installation shall permit free movement of pipe.
4. Patching of work, where necessary, is to be done by a mechanic of the appropriate trade. Unless otherwise noted, patching for Work performed under this Section shall be immediately repaired as part of the Work of this Section.

B. Pipe Sleeves: Install pipe sleeves where piping passes through walls, floors, ceilings, and roofs.

1. Do not install sleeves through structural members of work, except as detailed on Drawings, or as reviewed and approved by Architect/Engineer.
2. Install sleeves accurately centered on pipe runs.
3. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run.
4. Where insulation includes vapor barrier jacket, provide sleeve with sufficient clearance for installation.
5. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves.
6. Extend floor sleeves 1/4 inch above level floor finish, and 3/4 inch above floor finish sloped to drain unless otherwise noted.
7. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.
8. Where piping passes through non-fire rated, or non-waterproof, partitions, floors, and walls, apply pipe insulation continuous through pipe sleeves.
9. Do not install sleeves through suspended ceilings.
10. Caulk non-fire rated sleeves with sealant.

C. Protection

1. Provide proper protection to the building during the execution of Work involved under this contract heading.
2. This protection shall include covering apparatus, building surfaces, and other materials to protect same from dirt; adequate temporary connections to protect apparatus from damage and required shielding to protect finished parts of the building. The following shall apply where applicable:
 - a. Protect finished floors from chips and cutting oil by the use of metal chip receiving pans and oilproof floor covers.
 - b. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
 - c. Protect equipment and finished surfaces from paint droppings, insulation adhesive, and sizing droppings, etc., by use of drop cloths.
3. Pumps, motors, fans, and other rotating/reciprocating equipment stored for this Project shall be adequately protected with openings, bearings, etc., covered to exclude dust and

moisture. Stock piled pipe, valves, fittings, ductwork, etc., shall be placed on dunnage and protected from weather and from entry of foreign material.

4. During installation and until final connections are made, piping and ductwork shall be protected against entry of foreign matter. Equipment connections shall be carefully sealed until the actual time of system tie-in.

D. Accessibility

1. Provide a union or flange in the piping at each screwed or welded valve, device, or item of equipment, and elsewhere as required for accessibility of repair. Each union shall be so installed as to permit the removal of item without disconnection of any piping except at the union.

3.02 EMERGENCY REPAIRS OR OPERATION

- A. The Owner reserves the right to make emergency repairs and protection of the equipment and systems in operation without voiding the Contractor's guarantee bond or relieving the Contractor of his responsibility during the bonding period.

3.03 PROVISIONS FOR LATER INSTALLATIONS

- A. Where work cannot be installed as the structure is being erected, the Contractor for such work shall provide and arrange for the building-in of boxes, sleeves, inserts, fixtures, and devices necessary to permit installation of the omitted work during later phases of construction. The Contractor shall arrange for layout, chases, holes, and other openings which must be provided in masonry, concrete, and other work.
- B. The Contractor shall be responsible for becoming informed of the nature and arrangement of the materials and construction to which his work attached or passes through.

3.04 FINAL COMPLETION

- A. Work shall be cleaned prior to Substantial Completion of the Work.
- B. Retouch or repaint factory painted prime and finish coats where scratched or damaged. Whenever retouching will not be satisfactory, in the opinion of the Architect/Engineer, the Architect/Engineer has the option to require complete repainting until the desired appearance is obtained.
- C. The Contractor shall clean equipment; restore damaged materials, remove grease, oil chemical, paint spots, and stains; and leave the Work in condition acceptable to Owner and Architect/Engineer.
- D. On completion of his Work, the Contractor shall remove and see that each of his subcontractors removes from the site tools, equipment, surplus materials, and rubbish pertaining to his operations, and pay cost for such removal and disposition.
- E. Contractor shall explain all components of the plumbing system and demonstrate their operation and maintenance to the owner's representative.

3.05 COORDINATION DRAWINGS

- A. Division 23 Mechanical contractor shall be responsible for creating Coordination drawings. Division 22 Plumbing contractor shall coordinate plumbing piping layout including plumbing mains, vent piping mains with Division 23 Mechanical contractor to include work on coordination drawings.
 1. All coordination drawings are to be created with a 3D modeling software that is compatible with Autodesk Navisworks.

3.06 MAINTENANCE AND OPERATING MANUALS AND INSTRUCTIONS

- A. Comply with Section 01 7800 and the following:
- B. Bind the written operating instructions, shop drawings, equipment catalog cuts, and manufacturer's instructions into the binder with each section separated by tabbed dividers. Material to be assembled as follows:

1. First Page --Title of Job, Owner, Address, Date of submittal, Name of Contractor, and Name of Architect/Engineer. Emergency operating instructions and/or list of service organizations (including address and telephone numbers) capable of rendering emergency service on 24 hour calls.
2. Second page--Index
3. Sections--Each section shall include a subsection with a tab divider. The tab shall list the contents of the the divided section. There shall be a subsection that contains the following information:
 - a. Written list of items requiring service and either state the service needed or refer to the manufacturer's data in the binder that described the proper service.
 - b. A copy of the approved shop drawing for all systems, equipment, and components (clearly marked for item furnished).
 - c. A copy of each manufacturer's operating instructions with an index at the beginning of the section.
 - d. A list of equipment used on the job, Contractor's purchase order numbers, supplier's name, and address.
4. Maintenance and operating manuals and instructions shall be also forwarded in electronic format via USB flash drive. Folders shall be created for each section and subfolder for each fixture and/or equipment required for the project.

3.07 RECORD DRAWINGS

- A. The Contractor shall keep a running record of each change and deviation from the Drawings. Record shall be kept clean and undamaged upon a set of Drawings used for no other purpose. Upon completion of the Project, the Contractor shall submit to the Architect/Engineer one complete set of drawings which have been corrected to show deviations plus "Project Record Drawing" and the Contractor's letterhead type information. With the submittal shall be 2 sets of prints made from the corrected drawings.
 1. CADD drawing option may be used by Contractor. Disks with specific Drawings are available from Architect/Engineer.
- B. Record Drawings shall show:
 1. Size, type, and capacity of materials, devices, or pieces of equipment.
 2. Location of devices or pieces of equipment.
 3. Routing of piping (above and below grade), or other building services.
- C. These drawings shall also record the location of concealed piping by indication of measured dimensions to each such line from readily identifiable and accessible walls or corners of the building.
- D. Record drawings must be complete and accurate with regard to concealed piping, like equipment, or devices. Unless record drawings are sufficiently accurate to permit immediate location and identification of concealed work with a minimum of cutting, record drawings will be considered inadequate and the contract work deemed incomplete.

END OF SECTION

**SECTION 22 05 53
PLUMBING IDENTIFICATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tags.
- B. Pipe markers.

1.02 RELATED REQUIREMENTS

- A. Section 09 91 23 - Interior Painting: Identification painting.
- B. Section 22 1005 - Plumbing Piping.

1.03 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems 2020.
- B. ASME A13.1 - Scheme for the Identification of Piping Systems 2020.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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. Piping: Tags.
- B. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.02 MANUFACTURERS

- A. Seton Identification Products
- B. Brady Corporation
- C. Champion America, Inc
- D. Brimar, Inc.
- E. Substitutions: See Section 01 6000 - Product Requirements.

2.03 TAGS

- A. Metal Tags: Brass with Engraved letters; letters to be filled with black ink; tag size minimum 1-1/2 inch diameter with smooth edges.
- B. Each valve shall have identifying letter(s) designating the system and an identifying sequential number designating the unit, such CW-# for cold water lines and HW-# for hot water lines. Identifying letters for piping systems shall be as follows:
 - 1. CW - Domestic Cold Water Supply
 - 2. HW - Domestic Hot Water Supply
- C. Chart: Typewritten letter size list in anodized aluminum frame. Five copies (or sets) of valve tag charts of valves shall be furnished by each respective Contractor; said charts shall include the following items:
 - 1. Valve Identification
 - 2. Room Location (Owner Room Number)
 - 3. Room Location (Drawing Sheet Room Number)

4. Purpose

- D. Mount one set of valve tag charts in an anodized aluminum frame with plastic and secured on a wall in the mechanical room or as otherwise directed. Second set of charts to be prepared for "trouble shooting". The third, fourth, and fifth charts shall be bound into the operating and maintenance manuals.

2.04 PIPE MARKERS

- A. Comply with ASME A13.1.
- B. 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.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- E. Color code as follows:
1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.
 2. Fire Quenching Fluids: Red with white letters.
 3. Flammable Fluids (Gases): Yellow with black letters.
 4. Compressed Air: Blue with white letters.

2.05 CEILING TAGS

- A. Description: 3/4 inch diameter colored, pressure-sensitive adhesive paper circles. Apply circles to ceiling grid below location of system equipment per following code.
- B. Description: Steel with 3/4 inch diameter color coded head or 1/2 inch diameter colored, pressure-sensitive adhesive paper circles. Apply circles to ceiling grid below location of system equipment per following code.
- C. Color code as follows:
1. Plumbing Valves: Green.

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 plastic tape pipe markers with lettering facing down to allow for identification from ground level.
- F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- G. Identify water heaters, hot water storage tank, and expansion tank with plastic nameplates or aluminum nameplates. Small devices, such as in-line pumps, may be identified with tags.
- H. Identify valves in main and branch piping with tags.

- I. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure (where applicable). Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet 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 22 07 17
PIPING SAFETY COVERS**

PART 1 GENERAL

2.01 SECTION INCLUDES

- A. Piping Safety Covers.

2.02 RELATED REQUIREMENTS

- A. Section 01 3329 - Sustainable Design Reporting
- B. Section 22 0719 - Plumbing Piping Insulation.
- C. Section 22 1005 - Plumbing Piping.

2.03 REFERENCE STANDARDS

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 1998.
- B. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2004.
- C. ASTM D 635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2003.
- D. ASTM D 2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2005.
- E. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances; Underwriters Laboratories Inc.; 1996.

2.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's descriptive literature for products specified in this section.
- C. Shop Drawings: Indicate locations and configurations of piping insulation for indicated plumbing configurations.
- D. Manufacturer's printed installation instructions for each specified product.

2.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products of this section in manufacturer's unopened packaging until installation; maintain storage conditions for products in accordance with manufacturer's recommendations.

PART 2 PRODUCTS

3.01 MANUFACTURERS

- A. Truebro, Inc.
- B. Dearborn Safety Series
- C. McGuire Manufacturing, Inc.
- D. Plumberex
- E. Keeney Manufacturing Co.
- F. Proflo.
- G. Zurn.
- H. Substitutions: See Section 01 6000 - Product Requirements.

3.02 PIPING INSULATION ACCESSORIES

- A. Provide products that comply with the following:
 - 1. Americans With Disabilities Act (ADA), Article 4.19.4.

2. ANSI/ICC A117.1, American National Standard for Accessible Buildings and Facilities.
 3. BOCA Basic Building Code.
 4. Requirements of applicable building code.
- B. Piping Safety Covers:
1. Characteristics: Three-piece molded assembly, minimum 1/8 inch wall thickness, with internal ribs to provide air space between piping and piping insulation jacket, molded to receive manufacturer's snap-clip fasteners.
 2. Vinyl Material: Impact-resistant and stain-resistant molded closed-cell anti-microbial vinyl compound, UV-stable, non-fading, non yellowing; having the following performance characteristics:
 - a. Burning Characteristics: 0 seconds Average Time of Burning (ATB), 0 mm Area of Burning (AEB), when tested in accordance with ASTM D 635.
 - b. Thermal Conductivity: K-value 1.17, when tested in accordance with ASTM C 177.
 - c. Indentation Hardness: 60, minimum, when tested in accordance with ASTM D 2240, using Type A durometer.
 3. Trap Assembly Cover: Three-piece assembly, with removable clean-out nut enclosure.
 4. Angle Stop Covers: Formed with hinged cap for access to valve without requiring cover removal.
 5. Configurations: In accordance with manufacturer's product data for project piping configurations indicated on drawings.
 6. Color: China White, gloss finish; paintable.
 7. Fasteners: Manufacturer's standard re-usable snap-clip fasteners; wire-tie fasteners not permitted.

PART 3 EXECUTION

4.01 EXAMINATION

- A. Verify that piping configurations are correct type for piping cover component configurations specified.

4.02 INSTALLATION

- A. Install products of this section in accordance with manufacturer's printed installation instructions.

4.03 PROTECTION OF INSTALLED PRODUCTS

- A. Do not allow damage to installed products by subsequent construction activities; protect products until Substantial Completion.

END OF SECTION

**SECTION 22 10 06
PLUMBING PIPING SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drains.
- B. Floor drains.
- C. Cleanouts.
- D. Water hammer arrestors / Shock Absorbers.
- E. Mixing valves.
- F. Trap Primers.
- G. Trap Seal Protection Devices

1.02 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 40 00 - Plumbing Fixtures.

1.03 REFERENCE STANDARDS

- A. ASME A112.6.3 - Floor and Trench Drains 2019.
- B. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers 2017.
- C. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Prevention Assemblies 2021.
- D. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance 2011 (Reaffirmed 2016).
- E. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices 2020.
- F. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- G. NSF 372 - Drinking Water System Components - Lead Content 2022.
- H. PDI-WH 201 - Water Hammer Arresters 2017.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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. Certificates: Certify that grease interceptors meet or exceed specified requirements.
- E. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage.

1.07 EXTRA MATERIALS

- A. Supply for City of Greenville's use in maintenance of project:
 - 1. Two loose keys for each outside wall hydrants and indoor hose bibbs.

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. Zurn Industries, Inc.
 - 2. Wade.
 - 3. Josam Company.
 - 4. Jay R. Smith Manufacturing Company.
 - 5. Watts Regulator Company.
 - 6. MIFAB
 - 7. Sioux Chief
 - 8. ABT, Inc
 - 9. Hubell, Inc.
 - 10. Froet Industries
 - 11. Eric'sons Dura Trech
 - 12. ACO, Inc
 - 13. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Floor Drain (FD):
 - 1. ASME A112.21.1; cast iron two piece body with double drainage flange, weep holes, and round, adjustable nickel-bronze strainer.
- C. Floor Drain (FD-):
 - 1. ASME A112.21.1; cast iron two piece body with double drainage flange, weep holes, perforated removable sediment bucket, and round, adjustable nickel-bronze strainer.
- D. Floor Drain (FD-):
 - 1. ASME A112.21.1; cast iron two piece body with double drainage flange, weep holes, and round, adjustable nickel-bronze strainer and polished nickel bronze funnel.
- E. Floor Drain (FD-):
 - 1. Cast iron 12 inch by 12 inch floor drain sink with a square nickel top, with separate trap, seepage flange, interior secondary strainer, and heel proof full grate secured with slotted screws.

2.03 CLEANOUTS

- A. Manufacturers:
 - 1. Wade
 - 2. Jay R. Smith Manufacturing Company
 - 3. Josam Company
 - 4. Zurn Industries, Inc
 - 5. Watts Regulator Company.
 - 6. MIFAB
 - 7. Sioux Chief
 - 8. Neenah
 - 9. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Cleanouts at Exterior Surfaced Areas (RH):
 - 1. Round cast nickel bronze access frame and non-skid cover.
- C. Cleanouts at Interior Finished Floor Areas (CO):
 - 1. Cast iron, inside caulking, with adjustable nickel-bronze round tops. Provide "72" carpet marker in carpeted areas. Review Finish Schedule for locations.

2. PVC, inside caulking, with adjustable nickel-bronze round tops. Provide "72" carpet marker in carpeted areas. Review Finish Schedule for locations.
- D. Cleanouts at Interior Finished Wall Areas (WCO):
1. Concealed screw plug with countersunk wrench hole and stainless steel screwed flush cover.

2.04 WATER HAMMER ARRESTORS / SHOCK ABSORBER

- A. Manufacturers:
1. Jay R. Smith Manufacturing Company.
 2. Zurn Industries, Inc.
 3. Watts Regulator Company.
 4. Wade.
 5. Josam.
 6. MIFAB
 7. Oatey
 8. Precision Plumbing Products
 9. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Water Hammer Arrestors:
1. Stainless Steel or Copper construction, ASSE Listed, Piston or Bellow type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range 34 to 250 degrees F and maximum 150 psi working pressure.

2.05 TRAP PRIMERS

- A. Manufacturers:
1. Precision Plumbing Products; Model Oregon #1
 2. Jay R. Smith Manufacturing Company.
 3. Watts Regulator Company.
 4. Zurn Industries, Inc.
 5. Wade.
 6. Josam.
 7. MIFAB
 8. Substitutions: See Section 01600 - Product Requirements.
- B. Trap Primers
1. Diaphragm operated primer which delivers fresh water to floor drains by sensing a pressure drop in water line.
 2. Provide trap primer for floor drains as required by State and Local codes. Connect floor drain to a flush valve or solenoid valve. Extend 1/2" piping from trap primer to floor drain connection below finish floor. Provide distribution manifold for multiple floor drain connections to one trap primer.

2.06 TRAP SEAL PROTECTION DEVICES

- A. As an alternate to the trap primers for floor drains, a trap seal protection device can be used as allowed per the OBC, section 106.7.1
- B. Manufacturers:
1. Sureseal
 2. Mifab
 3. Oatey
 4. Green Drain, Inc.
 5. Zurn
 6. Substitutions: See section 01 6000 - Product Requirements
- C. Construction: Mechanical device shall be an inline floor drain trap sealer, ASSE 1072 or IPC 09.1 listed. Body shall be constructed of ABS plastic. Diaphragm and sealing gasket to be

constructed of neoprene rubber. Compression fitting sealing gasket 80 durometer.

2.07 MIXING VALVES

- A. Mixing Valves:
 - 1. Manufacturers:
 - a. Powers.
 - b. Symmons
 - c. Lawler
 - d. Bradley
 - e. Acorn
 - f. Conbraco Industries/ Apollo Valves
 - g. Caleffi
 - h. Arm
 - i. Leonard Valve Company
 - j. Guardian
 - k. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Lavatory thermostatic mixing valve: Nickel plated brass/bronze lead free body conforming to NSF-61-G. Adjustable hand knob to allow for exact temperature adjustment. Meet the performance requirements of ASSE 1070 and CSA B125 certified. Capable to provide tempered water to multiple lavatories.
 - 3. Accessories:
 - a. Check valve on inlets.
 - b. Volume control shut-off valve on outlet.
 - c. Stem thermometer on inlets and outlet. Not required for lavatory mixing valve.
 - d. Strainer stop checks on inlets.

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 janitor rooms, flush valves, interior and exterior hose bibs.
- 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 service sinks, washing machine boxes, and flush valves serving water closets and urinals. All water hammer arrestors shall be accessible above the ceiling.
- H. Thermostatic mixing valves shall be installed where and as denoted on the Drawings to mix hot and cold water, delivering a mixture at a constant temperature.
- I. Install mixing valves at +5'-0" above finished floor.
- J. Install lavatory thermostatic mixing valves serving single lavs directly below the lavatory. Locate as high as possible below lavatory.
- K. Install lavatory thermostatic mixing valves serving multiple lavs above lay-in ceiling. Locate as to provide maintenance access.
- L. Install trap primers for floor drains per state codes. Refer to detail on drawings for installation requirements.

- M. Install all drains at 99'-11-1/2" elevation (Finish Floor = 100'-0") unless noted otherwise on drawings. Install floor drains in shower areas to accommodate a floor slope of 1:48. The minimum height of the floor drain shall be 99'-11-1/2".

END OF SECTION

**SECTION 22 30 00
PLUMBING EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water Heaters:
 - 1. Residential electric.

1.02 RELATED REQUIREMENTS

- A. Section 22 0553 - Plumbing Identification

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. UL 174 - Standard for Household Electric Storage Tank Water Heaters Current Edition, Including All Revisions.

1.04 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; 1999.
- B. UL 174 - Standard for Household Electric Storage Tank Water Heaters Current Edition, Including All Revisions.
- C. ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.05 SUBMITTALS

- A. See Section 01 30 00 - 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 certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
 - 4. Provide electrical characteristics and connection requirements.
- C. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in City of Greenville's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
- C. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.
- D. Contractor shall explain all components of the plumbing system and demonstrate their operation and maintenance to the owner's representative.
 - 1. All demonstrations and training shall be video-taped by the Plumbing Contractor. Two copies shall be turned over to the owner's representative.

1.07 CERTIFICATIONS

- A. Gas Water Heaters: Certified by CSA International to ANSI Z21.10.1 or ANSI Z21.10.3, as applicable, in addition to requirements specified elsewhere.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.09 WARRANTY

- A. Provide five year manufacturer warranty for hot water storage tank.
- B. Provide three year manufacturer warranty for commercial tank type water heater.
- C. Provide five year manufacturer warranty for commercial water heater.
- D. Provide manufacturer standard warranty for circulating pumps.

PART 2 PRODUCTS

2.01 WATER HEATERS

- A. Manufacturers:
 - 1. A.O. Smith Water Products Co; [____]: www.hotwater.com/#sle.
 - 2. Bock Water Heaters, Inc; [____]: www.bockwaterheaters.com/#sle.
 - 3. Rheem Manufacturing Company; [____]: www.rheem.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Residential Electric:
 - 1. Type: Automatic, electric, vertical storage.
 - 2. Performance: Refer to schedule on drawing.
 - 3. Tank: Glass lined welded steel, thermally insulated with one inch thick glass fiber; encased in corrosion-resistant steel jacket; baked-on enamel finish.
 - 4. Controls: Automatic water thermostat with externally adjustable temperature range from 120 to 170 degrees F, flanged or screw-in nichrome elements, enclosed controls and electrical junction box and operating light. Wire double element units so elements do not operate simultaneously.
 - 5. Accessories:
 - a. Water Connections: Brass.
 - b. Dip Tube: Brass.
 - c. Drain valve.
 - d. Anode: Magnesium.
 - e. Temperature and Pressure Relief Valve: ASME labeled.

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. All plumbing equipment should be started up by a manufacturer representative.
- C. Coordinate with plumbing piping and related fuel piping work to achieve operating system.
- D. Install and place in operation the water heater system as shown on the Drawings, complete with piping, supports, etc., and as recommended by the manufacturer. System shall meet or exceed state and local codes.
- E. Provide shut-off valves and unions entering and leaving water heater. Provide check valve on cold water line to heater before expansion tank.
- F. Water Softener:

1. Factory authorized service representative shall provide startup and owner training for water softener system.
2. Division 22 plumbing contractor to provide initial fill of salt for each brine tank at the completion of the project.

END OF SECTION

**SECTION 22 40 00
PLUMBING FIXTURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush Valve Water closets.
- B. Wall Hung Urinals.
- C. Lavatories.
- D. Service sinks.
- E. Drinking fountains.

1.02 RELATED REQUIREMENTS

- A. Section 06 41 00 - Architectural Wood Casework: Preparation of counters for sinks and lavatories.
- B. Section 22 10 05 - Plumbing Piping.
- C. Section 22 10 06 - Plumbing Piping Specialties.
- D. Section 22 30 00 - Plumbing Equipment.

1.03 REFERENCE STANDARDS

- A. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration 2008 (Reaffirmed 2013).
- B. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use 1997 (Reaffirmed 2017).
- C. ASME A112.19.2 - Ceramic Plumbing Fixtures 2018, with Errata.
- D. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks 2022.
- E. ISFA 2-01 - Classification and Standards for Solid Surfacing Material 2013.
- F. NEMA LD 3 - High-Pressure Decorative Laminates 2005.
- G. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- H. NSF 372 - Drinking Water System Components - Lead Content 2022.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Samples: Submit one sets of color chips for each standard color.
- D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in City of Greenville's name and registered with manufacturer.

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.
- B. Install per the requirements of the current plumbing code.

1.06 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.

1.07 WARRANTY

- A. Provide manufacturer's standard warranty for all plumbing fixtures and trim.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 FLUSH VALVE WATER CLOSETS

- A. Manufacturers:
 - 1. American Standard, Inc
 - 2. Kohler Company
 - 3. Zurn Industries, Inc
 - 4. Sloan Valve Company.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Bowl:
 - 1. ASME A112.19.2; wall hung, siphon jet flush action, vitreous china closet bowl, with elongated rim, 1-1/2 inch top spud, china bolt caps.
 - a. Water Consumption: 1.28 gallon per flush
- C. Flush Valve
 - 1. Manufacturers:
 - a. Sloan Valve Company.
 - b. Kohler.
 - c. American Standard.
 - d. Zurn Industries, Inc.
 - e. Geberit
 - f. Moen
 - g. Hydrotek
 - h. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Sensor-Operated Type: ASME A112.18.1; exposed, chrome plated, diaphragm type with low voltage hard wired solenoid operator, infrared sensor and over-ride button, vacuum breaker, check stops.
 - 3. Water consumption: 1.28 gallons per flush.
- D. Seats:
 - 1. Manufacturers: (Refer to Schedule on Drawings for Model numbers)
 - a. American Standard, Inc
 - b. Beneke
 - c. Bemis Manufacturing Company.
 - d. Church Seat Company.
 - e. Olsonite.
 - f. Zurn Industries, Inc
 - g. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, with cover.
- E. Carriers:
 - 1. Manufacturers:
 - a. Watts Drainage
 - b. JOSAM Company.
 - c. Sloan Valve Company.
 - d. Zurn Industries, Inc.
 - e. Wade.

- f. Substitutions: See Section 01 60 00 - Product Requirements.
- 2. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.
- 3. 500 pound load capacity
- 4. 3" sanitary outlet

2.03 WALL HUNG URINALS

- A. Manufacturers
 - 1. American Standard, Inc
 - 2. Kohler Company
 - 3. Zurn Industries, Inc
 - 4. Sloan Valve Company
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Urinals:
 - 1. Vitreous china, ASME A112.19.2, vitreous china, wall hung, high efficiency washout urinal with shields, integral trap, 3/4" top spud, concealed support.
 - a. Water Consumption: 0.125 gpf (pint).
- C. Flush Valve
 - 1. Manufacturers:
 - a. Sloan Valve Company.
 - b. Kohler.
 - c. American Standard.
 - d. Zurn Industries, Inc.
 - e. Geberit
 - f. Moen
 - g. Hydroteck
 - h. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Sensor-Operated Type: ASME A112.18.1; exposed, chrome plated, diaphragm type with low voltage hard-wired solenoid operator, infrared sensor and over-ride button, vacuum breaker, check stops.
 - 3. Water Consumption: 0.125 gallon per flush (1 pint)
- D. Carriers:
 - 1. Manufacturers:
 - a. Watts Drainage.
 - b. JOSAM Company.
 - c. Sloan Valve Company.
 - d. Zurn Industries, Inc.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

2.04 LAVATORIES

- A. Manufacturers:
 - 1. American Standard, Inc
 - 2. Kohler Company.
 - 3. Zurn Industries, LLC; []: www.zurn.com/#sle.
 - 4. Bradley
 - 5. Just
 - 6. Elkay
 - 7. Willoughby, Inc.
 - 8. Substitutions: See Section 01 60 00 - Product Requirements.

- B. Vitreous China Wall Hung Basin:
 - 1. ASME A112.19.2; vitreous china wall hung lavatory, rectangular basin with splash lip, front overflow, soap depression, and concealed arm supports.
 - a. Drilling Centers: 4 inch.
- C. Supply Faucet:
 - 1. Manufacturers: (Refer to Schedule on Drawings for Model Numbers)
 - a. Zurn Industries, Inc.
 - b. Chicago.
 - c. American Standard Inc.
 - d. Kohler
 - e. Moen.
 - f. Speakman
 - g. Hydrotek
 - h. Sloan Valve Company.
 - i. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Sensor Operated Lavatory Faucet (Kitchen Lavatory):
 - a. ADA Compliant, sensor activated, low voltage transformer, plug-in power, chrome plated brass, lead free in accordance with NSF-61-G, single hole installation, hand washing faucet with laminar flow spray head, thermostatic mixing valve conforming to ASSE 1070, splash proof circuit control module, automatic adjustable sensor range, cover-plate for 4" centers.
 - 1) Water Consumption: 0.5 gpm
- D. Accessories:
 - 1. Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon.
 - 2. ASSE 1070 compliant, point of use thermostatic tempering valve where noted. Mount above ceiling in accessible location.
 - 3. Grid Strainer.
 - 4. Removable key handle stops.
 - 5. Flexible supplies.
 - 6. Under sink piping covers. Refer to specification section 22 0717 Piping Safety Covers.
- E. Carrier:
 - 1. Manufacturers:
 - a. Zurn Industries, Inc.
 - b. JOSAM Company: www.josam.com.
 - c. Sloan Valve Company: www.sloanvalve.com.
 - d. Wade.
 - e. Watts Drainage.
 - f. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.

2.05 DRINKING FOUNTAINS

- A. Manufacturers: (Refer to Schedule on Drawings for Model numbers)
 - 1. Elkay Manufacturing Company: www.elkay.com/#sle.
 - 2. Halsey Taylor: www.halseytaylor.com/#sle.
 - 3. Acorn Aqua
 - 4. Oasis
 - 5. Stern Willams Products
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 SERVICE SINKS

- A. Manufacturers:

1. Zurn Industries, Inc:
 2. E. L. Mustee & Sons, Inc.
 3. Fiat.
 4. Swan.
 5. Willoughby, Inc.
 6. Stern Williams Products
 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Floor Service Sink:
1. 24 x 24 x 10 inch high white molded fiberglass, floor mounted, with one inch wide shoulders, vinyl bumper guard, stainless steel strainer.
- C. Trim:
1. Trim Manufacturers: (Refer to Schedule on Drawings for Model numbers)
 - a. Zurn Industries, Inc: www.zurn.com.
 - b. Chicago.
 - c. American Standard Inc.
 - d. Moen.
 - e. Sloan Valve Company: www.sloanvalve.com.
 - f. Kohler Company.
 - g. Speakman
 - h. Substitutions: See Section 01 6000 - Product Requirements.
 2. ASME A112.18.1 exposed wall type supply, ceramic disc valving with ADA lever handles, spout wall brace, vacuum breaker, check valves in water connections, hose end spout, strainers, eccentric adjustable inlets, bucket hook, removable key handle stops with covering caps and adjustable threaded wall flanges.
- D. Accessories:
1. 5 feet of 1/2 inch diameter plain end reinforced plastic hose.
 2. Hose clamp hanger.
 3. Mop hanger.
 4. Bumper Guard.
 5. Stainless Steel Wall Guards (Set of 2) - #20 Gage

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 or flexible braided stainless steel supply hose to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall supports and bolts.
- E. Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 90 05, color to match fixture.

- F. All shower components shall be sealed from moisture. All wiring connections shall be greased to prevent corrosion.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

- A. All science sinks, and matching fixtures to be supplied by casework manufacturer. Casework manufacturer will supply stub to below countertop for all water and gas connections. Coordinate location of stub-ups with the general contractor.
- B. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation. Provide casework manufacturer with templates for cutting sink holes.

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 SCHEDULES

- A. Fixture Heights: Install fixtures to heights above finished floor as indicated on plumbing fixture schedule on drawings. Refer to drawings for locations of ADA fixtures.

END OF SECTION

**SECTION 23 05 01
MECHANICAL MATERIALS & METHODS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Lubrication and packing
- B. Emergency repairs or operation
- C. Provisions for later installations
- D. Final completion
- E. Project Conditions
- F. Quality Assurance
- G. Supervision and cooperation
- H. Coordination drawings
- I. Maintenance and operating manuals
- J. Record drawings

1.02 RELATED REQUIREMENTS

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1 and 2, General Requirements, are included as a part of this Section as though bound herein.
- B. Refer to Section 01 1200 - Multiple Contract Summary for Work under other contracts.
- C. Commissioning
- D. Refer to Division 26, Electrical Specifications, and to the requirements stated therein applicable to the Mechanical Work, where coordination of trades is covered.
- E. The Drawings prepared for this Project are an outline to show where pipes, ducts, and apparatus must go in order to harmonize with the building and installations of the various trades. Work must be installed in accordance with the Drawings insofar as possible. Drawings shall be carefully checked during the course of bidding and construction. If discrepancies, errors, or omissions are discovered prior to or during the construction phase, notify the Engineer immediately for interpretation or correction. Take necessary measurements and be responsible for same, including clearances for equipment that is to be furnished. The Architect/Engineer shall reserve the right to make minor location changes of piping and equipment where such adjustments are deemed desirable from an appearance or operational standpoint. Such changes will be anticipated sufficiently in advance to avoid extra work or unduly delay progress on the Project.
- F. The general building drawings shall be used to obtain dimensions and exact locations and as a check with other Contractors to avoid interferences with their Work. Refer to applicable Drawings on branches of the Work where other trades are involved on the Project so that added field work and job delays resulting from conflicts between crafts can be avoided. Piping or ductwork that is prefabricated before coordinating with the other trades may have to be redone at no additional cost if conflicts are encountered.

1.03 SUMMARY

- A. The Contractor(s) shall provide the labor, materials, equipment, appliances, services and transportation, and perform the operations in connection with the construction and installation of the Work. Work shall be as herein specified and as denoted on the accompanying Drawings.
- B. The Contractor(s) shall arrange and pay for permits and inspections required in connection with the Work. The Contractor shall apply for and pay for meters, regulators, recorders, and gauges

required. The Contractor must present to the Owner through the Architect/Engineer, properly signed certificates of final inspection by the governing authorities when they become due and shall not cover up Work until approved by those authorities.

- C. Materials or labor obviously required to fully complete the Work shall be included, even though each item necessarily involved is not specifically mentioned or shown. Such Work and materials shall be furnished and shall be of the same grade or quality as the parts actually specified and shown. Should there be a conflict between the plans and Specifications, the greater quantity and better quality shall be furnished.
- D. Should an overlap of Work between the various trades become evident, the Engineer shall be notified. Such an event shall not relieve the Contractor of the responsibility for the Work called for under his branch of the Specifications until a written clarification or directive is issued concerning the matter.
- E. Arrange all mechanical supports to prevent eccentric loading of joists and joist girders. Locate supports at joist panel points.
 - 1. If support must occur between panel joints, then threaded rods shall be dropped from both panel points, an adequate angle to both, and then the support attached to the angle is required.
 - 2. Unless specifically indicated or approved by Garmann Miller & Associates Inc. do not provide support from roof decks.
- F. Related Work by Others
 - 1. Unless otherwise stipulated under a specific Section of this Division, motor disconnects and starters shall be provided as Work under Division 26, Electrical.
 - 2. Electric power wiring shall be included as Work under the electrical wiring section of Division 26, Electrical, except as follows:
 - a. Control wiring regardless of voltage shall be included as Work under specific Sections of Division 23.
 - b. Internal package type wiring as specified under specific Sections of Division 23.
- G. Cutting of water lines, electric conduit, or similar service lines in the course of Work performed under this Section shall be immediately repaired as part of the Work of this Section.

1.04 REFERENCE STANDARDS

- A. Standards are described by reference to various associations. These are in addition, but not limited to, to those listed in:
 - 1. ANSI American National Standards Institute
 - 2. ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers
 - 3. ASME American Society of Mechanical Engineers
 - 4. AWS American Welding Society
 - 5. NFPA National Fire Protection Association
 - 6. OSHA Occupational Safety and Health Act
 - 7. SMACNA Sheet Metal and Air Conditioning Contractors National Association
 - 8. UL Underwriters' Laboratories, Inc.
- B. Work shall be in complete accordance with codes, rules, and ordinances, regulations of authorities, bodies, associations, and governments, having proper or legal jurisdiction. Specifically, the following requirements shall be met in their entirety.
 - 1. State and Local Rules, Regulations, Codes, Statutes, and Ordinances
 - 2. Ohio Mechanical Code, 2017 Edition.
 - 3. ASHRAE 90.1-2010; Energy Standard for Buildings Except Low Rise Residential Buildings.
 - 4. ASHRAE 62.1-2016; Ventilation for Acceptable Indoor Air Quality.
 - 5. NFPA 70 - National Electrical Code; National Fire Protection Association; 2017 applicable requirements.
 - 6. National Board of Fire Underwriters

7. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 1993 (and Revision 1,2,3).
 8. Other Codes and Standards as specifically noted in each Section of the Specifications.
 9. Americans with Disabilities Act (ADA)
- C. References made to codes and standards, in these Specifications or on the Drawings, shall be taken to mean the latest edition, amendment, or revision of such reference in effect as of the date indicated on the Bid Documents unless otherwise noted.

1.05 SUBMITTALS

- A. Submit capacity requirements, catalog cuts, and illustrations in accordance with requirements of specifications and as required by specific Sections of this Specification.
- B. Shop Drawings shall be prepared by the Contractor or supplier.
 1. Where limited space is available due to the nature of the Work, the requirements for shop and working drawings will apply, and the Contractor is required to prepare complete shop drawings showing the exact disposition of apparatus, equipment, piping, ductwork, and the like, and its relation to the building so there will be no irregularities or interferences. Shop drawings shall be prepared in coordination with other Contractors and other trades.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in City of Greenville's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Instruments used by the Contractor shall be accurately calibrated and maintained in good working condition.
- B. Products and test instruments used shall be subject to approval of Architect/Engineer.
- C. Products and test instruments used shall be provided by each respective Contractor.
- D. Note that systems involved under this Contract heading shall be in accordance with applicable requirements listed in NFPA Standard 90A.
- E. Materials used in this Contract shall be those specified herein unless proposals for the use of alternate materials have been submitted and accepted in writing, as provided herein before. Materials shall be strictly first grade of their kind and shall be new and in first-class condition when installed. Damaged materials will be rejected and must be replaced by proper and acceptable materials. Materials shall be similar and in accordance with the provisions of this Specification.
- F. No materials or equipment may be installed under this contract heading which do not meet the approval of the authorities having jurisdiction. Specific materials may have certain restrictions or exclusions as to their usage, including where they may not be located. Such regulations shall be adhered to where applicable. The requirements and regulations of the local and state building codes and regulations currently adopted shall be adhered to.

1.07 PROJECT CONDITIONS

- A. Unless otherwise stipulated under a particular heading, the following rules relative to responsibilities of the several Contractors and subcontractors will apply.
 1. Each Contractor shall install roughing-in work pertaining to his trade for connection of Work performed under other Sections of these Specifications.
- B. Certain areas will be designated for the storage of materials and equipment and cooperation with the Owner in minimizing interference with existing operations will be mandatory.
 1. Where possible, store materials inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping.
 2. Follow manufacturer's instructions for receiving, inspecting, handling, storage, and protection of products prior to final installation
- C. Equipment Clearances and Requirements

1. For many items of equipment described in these Specifications, several manufacturers are listed. The manufacturer listed on the drawings is the make on which the layout was based and on which clearances, service required electrical, and plumbing characteristics, etc., have been checked. Additional manufacturers listed are considered acceptable.
 2. Due to the possibility of restrictions imposed by space limitations, the responsibility for resolving conflicts resulting from the use of equipment other than first named shall rest with the equipment supplier and the Contractor. Submittals for this equipment will be considered as a statement that clearances for access, service, maintenance, etc., have been checked and found adequate.
 3. Alternate equipment or the equipment of additional manufacturers named in these documents shall meet Base Bid Specifications. In the event such equipment or any equipment which the bidder proposes to furnish, deviates from the requirements of equipment first named regarding electric service, power wiring, control wiring, plumbing or piping, sound attenuation, or vibration damping, it shall be the responsibility of the bidder to include in his price a sufficient sum to cover additional costs or charges resulting therefrom.
- D. In general, the piping and ductwork shown on the Drawings shall be considered as diagrammatic for clearness in indicating the general run and connections required, and may not be shown in its true position. The piping and ductwork and equipment may have to be offset, lowered or raised, as required, or as directed at the site in order to accommodate field conditions.

1.08 SUPERVISION AND COOPERATION

- A. Work done by the Contractor under this Division shall include the services of an experienced superintendent, who shall be constantly in charge of the work, together with the qualified journeymen, helpers, and laborers required to properly unload, install, connect, adjust, start, and operate, and test the Work involved, including related equipment and materials furnished under other contracts or by the Owner.
- B. A Pre-Installation meeting shall convene one week before starting work of this section.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide motors and starter/disconnect switches having the voltage and electrical characteristics of the service available and where denoted on Drawings or as required.
1. All motors shall be high efficiency type.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Lubrication and Packing
1. Rotating and reciprocating equipment requiring lubrication shall be lubricated with the correct grade, type, and quantity of lubricant before being placed in service.
 2. Each shaft containing a packing gland shall be checked for condition by backing the packing gland off and examining for proper grade, amount, and type of packing as recommended by the manufacturer. Upgrade to proper standards as required.
 3. Maintain lubrication gaskets and packing during construction and assure that at the time of acceptance by the Owner are in first-class operating conditions.
- B. Motors, Starters, Controls, and Wiring
1. Starter/disconnects, controls, and wiring shall be coordinated with the appropriate Contractors and completed as required by these Documents.
- C. Cutting and Patching
1. Cutting and drilling of walls, slabs, and structural members, required in conjunction with Work under this Section, shall be done under the supervision of the Architect/Engineer. Work shall be neatly done, removing no unnecessary material. Holes, openings, etc.,

shall be located where they will not weaken the structure. No beams, joists, etc., shall be cut without the written consent of the Architect/Engineer.

2. Cutting of holes in masonry and concrete shall be performed with a core drill to minimize spalling, and limit damage to wall. Locations shall be accurately determined and checked, and the appropriate drill bit shall be used to minimize hole size.
3. Patching of work, where necessary, is to be done by a mechanic of the appropriate trade. Unless otherwise noted, patching for Work performed under this Section shall be immediately repaired as part of the Work of this Section.

D. Protection

1. Provide proper protection to the building during the execution of Work involved under this contract heading.
2. This protection shall include covering apparatus, building surfaces, and other materials to protect same from dirt; adequate temporary connections to protect apparatus from damage and required shielding to protect finished parts of the building. The following shall apply where applicable:
 - a. Protect finished floors from chips and cutting oil by the use of metal chip receiving pans and oil proof floor covers.
 - b. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
 - c. Protect equipment and finished surfaces from paint droppings, insulation adhesive, and sizing droppings, etc., by use of drop cloths.
3. Pumps, motors, fans, and other rotating/reciprocating equipment stored for this Project shall be adequately protected with openings, bearings, etc., covered to exclude dust and moisture. Stock piled pipe, valves, fittings, ductwork, etc., shall be placed on dunnage and protected from weather and from entry of foreign material.
4. During installation and until final connections are made, piping and ductwork shall be protected against entry of foreign matter. Equipment connections shall be carefully sealed until the actual time of system tie-in.
5. During construction, all air intake openings on variable frequency drives, control panels, and other electronic equipment shall be protected with a temporary filter. At completion of project, filters shall be removed.

3.02 EMERGENCY REPAIRS OR OPERATION

- A. The Owner reserves the right to make emergency repairs and protection of the equipment and systems in operation without voiding the Contractor's guarantee bond or relieving the Contractor of his responsibility during the bonding period.

3.03 PROVISIONS FOR LATER INSTALLATIONS

- A. Where work cannot be installed as the structure is being erected, the Contractor for such work shall provide and arrange for the building-in of boxes, sleeves, inserts, fixtures, and devices necessary to permit installation of the omitted work during later phases of construction. The Contractor shall arrange for layout, chases, holes, and other openings which must be provided in masonry, concrete, and other work.
- B. The Contractor shall be responsible for becoming informed of the nature and arrangement of the materials and construction to which his work attached or passes through.

3.04 FINAL COMPLETION

- A. Work shall be cleaned prior to Substantial Completion of the Work.
- B. Retouch or repaint factory painted prime and finish coats where scratched or damaged. Whenever retouching will not be satisfactory, in the opinion of the Architect/Engineer, the Architect/Engineer has the option to require complete repainting until the desired appearance is obtained.

- C. Deliver filters, belts, and equipment, as required by this Specification, to Owner for Division 23 - HVAC Systems and obtained signed receipts of delivery.
- D. The Contractor shall clean equipment; restore damaged materials, remove grease, oil chemical, paint spots, and stains; and leave the Work in condition acceptable to Owner and Architect/Engineer.
- E. On completion of his Work, the Contractor shall remove and see that each of his subcontractors removes from the site tools, equipment, surplus materials, and rubbish pertaining to his operations, and pay cost for such removal and disposition.
- F. Contractor shall explain all components of the HVAC System and demonstrate their operation and maintenance to the owner's representative.
 - 1. All demonstration and training shall be video-taped by the HVAC Contractor. Two copies shall be turned over to the owner's maintenance staff.

3.05 COORDINATION DRAWINGS

- A. Division 23 Mechanical Contractor shall be responsible for creating coordination drawings. Coordinate all coordination with fire protection contractor, plumbing contractor, electrical contractor, and general trades contractor.
- B. All coordination drawings are to be created with a 3D modeling software that is compatible with Autodesk Navisworks.
- C. The coordination drawings shall include the following:
 - 1. Plan view of ductwork showing coordination with light fixtures, cable tray, hydronic piping, major plumbing mains, fire protection piping, structure, bulkheads, actual outside dimensions of ductwork heights, and widths of masonry openings.

3.06 MAINTENANCE AND OPERATING MANUALS AND INSTRUCTIONS

- A. Comply with Section 01 7800 and the following:
- B. Bind the written operating instructions, shop drawings, equipment catalog cuts, and manufacturer's instructions into the binder with each section separated by tabbed dividers. Material to be assembled as follows:
 - 1. First Page --Title of Job, Owner, Address, Date of submittal, Name of Contractor, and Name of Architect/Engineer. Emergency operating instructions and/or list of service organizations (including address and telephone numbers) capable of rendering emergency service on 24 hour calls.
 - 2. Second page--Index
 - 3. Sections--Each section shall include a subsection with a tab divider. The tab shall list the contents of the the divided section. There shall be a subsection that contains the following information:
 - a. Written list of items requiring service and either state the service needed or refer to the manufacturer's data in the binder that described the proper service.
 - b. A copy of the approved shop drawing for all systems, equipment, and components (clearly marked for item furnished).
 - c. A copy of each manufacturer's operating instructions with an index at the beginning of the section.
 - d. A list of equipment used on the job, Contractor's purchase order numbers, supplier's name, and address.
- C. Submit electronic sets of final documents in final form. Electronic format shall be PDF's on CD's or USB flash drives.

3.07 RECORD DRAWINGS

- A. The Contractor shall keep a running record of each change and deviation from the Drawings. Record shall be kept clean and undamaged upon a set of Drawings used for no other purpose. Upon completion of the Project, the Contractor shall submit to the Architect/Engineer one

complete set of drawings which have been corrected to show deviations plus "Project Record Drawing" and the Contractor's letterhead type information. With the submittal shall be 2 sets of prints made from the corrected drawings.

1. CADD drawing option may be used by Contractor. Disks with specific Drawings are available from Architect/Engineer at a nominal charge. Contact Architect/Engineer for current fee.
- B. Record Drawings shall show:
1. Size, type, and capacity of materials, devices, or pieces of equipment.
 2. Location of devices or pieces of equipment.
 3. Location of diffusers, volume dampers, fire dampers, smoke dampers, and related devices of the building systems.
 4. Routing of piping (above and below grade), ductwork, or other building services.
- C. These drawings shall also record the location of concealed ductwork and piping by indication of measured dimensions to each such line from readily identifiable and accessible walls or corners of the building.
- D. Record drawings must be complete and accurate with regard to concealed piping, ductwork, like equipment, or devices. Unless record drawings are sufficiently accurate to permit immediate location and identification of concealed work with a minimum of cutting, record drawings will be considered inadequate and the contract work deemed incomplete.

END OF SECTION

**SECTION 23 07 13
DUCT INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.

1.02 RELATED REQUIREMENTS

- A. Section 23 31 00 - HVAC Ducts and Casings: Glass fiber ducts.

1.03 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 C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material) 2019.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- F. ASTM E 119 (UL 263) - Standard Test Methods for Fire Tests of Building Construction and Materials.
- G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.
- H. ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

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 Fiber Glass
 - 2. Johns Manville Corporation
 - 3. Owens Corning Corp
 - 4. CertainTeed Corporation; []
 - 5. Manson
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

- B. Insulation: ASTM C553; glass fiber flexible, limited combustibility blanket.
 - 1. 'K' value: 0.27 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Minimum 1.0 PCF Density
 - 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: 0.029 ng/Pa s m (0.02 perm inch), when tested in accordance with ASTM E96/E96M.
 - 3. Secure with UL listed 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.

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. All insulation shall be applied so that there is no fiberglass exposed to the air stream without filters downstream. All fiberglass insulation, including all exposed edges, shall be coated, or mylar or other suitable material shall be provided between fiberglass and the air stream.
- D. Insulate 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 except where prohibited by code.

3.03 SCHEDULES

- A. Exhaust Ducts Within 10 ft of Exterior Openings and Where Noted on Drawings:
 - 1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
 - 2. Rigid Glass Fiber Duct Insulation: 1-1/2 inches thick.

END OF SECTION

**SECTION 23 31 00
HVAC DUCTS AND CASINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ductwork.
- B. Testing and Repair

1.02 RELATED REQUIREMENTS

- A. Section 01 3516.01 - Material Documentation Sheet
- B. Section 23 07 13 - DUCT INSULATION: External insulation and duct liner.
- C. Section 23 33 00 - Air Duct Accessories.
- D. Section 23 37 00 - Air Outlets and Inlets.

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 2022.
- B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- C. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012, 2nd Edition.
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- E. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines 2001.
- F. ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- G. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors current edition, including all revisions.

1.04 PERFORMANCE REQUIREMENTS

- A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.05 QUALITY ASSURANCE

- A. Construction of ductwork shall be in accordance with the recommendation of the latest edition of ASHRAE Handbook, HVAC Systems and Equipment, Chapter 16; Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA) Manual, First Edition - 1985 for low pressure duct; SMACNA Manual, Second Edition - 1975 for duct liner application standards; except as otherwise specified.
- B. Duct coverings, duct linings, tapes, and core materials in panels used in duct systems shall have a flame spread rating not over 25, without evidence of continued progressive combustion and a smoke developed rating no higher than 50. If coverings and linings are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame spread rating not over 25 and a smoke developed rating no higher than 50 when in the final dry state.
- C. Ductwork, shall be constructed of new prime grade galvanized sheet steel, manufactured in accordance with ASTM A525 standards for hot dip galvanized sheet and ASTM A527 for lock forming quality. Coating weight shall not be less than 1.25 oz. per sq.ft. where used in normal applications. Where marine atmospheres, corrosive industrial pollutants, and cyclic or continuous contact with water is evident, the coating weight shall not be less than 2.5 oz. per sq.ft. Sheets having coating that will flake or peel under any forming operation will not be

allowed.

1.06 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A standards.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. All ductwork kept on site shall have open ends wrapped and protected from dirt entering inside of duct. All ductwork and duct accessories shall be kept off floor.

1.08 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.

2.02 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.
- B. Low Pressure Insulated Flexible Ducts:
 - 1. Manufacturers:
 - a. Flexmaster Model 5M.
 - b. Thermaflex, Model M-KC
 - c. Buckley, Model Type 2.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Three ply aluminum/fiberglass/aluminized polyester film supported by helically wound spring steel wire; 1 inch thick, 3/4 lb. density, fiberglass insulation; air tight aluminized fire retardant vapor barrier film.
 - a. Pressure Rating: 5 inches WG positive and 5 inches WG negative.
 - b. Maximum Velocity: 4000 fpm.
 - c. Temperature Range: -10 degrees F to 160 degrees F.
- 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.

2.03 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. 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.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- E. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

2.04 MANUFACTURED DUCTWORK AND FITTINGS

- A. Manufacture in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

- B. Construct ductwork of new prime grade galvanized sheet steel, manufactured in accordance with ASTM A525 standards for hot dip galvanized sheet. Coating weight shall not be less than 0.90 oz. per sq.ft. where used in normal applications. Sheets having coating that will flake or peel under forming operation will not be allowed.
- C. Installation of sheet metal ducts and related work shall comply with applicable Local, State and National Codes, rules, regulations and ordinances, including the following specific codes:
 - 1. Air conditioning and ventilating systems of other than residence type NFPA No. 90A.
 - 2. Air conditioning, warm air heating, air cooling, and ventilating systems NFPA No. 90B.
- D. Minimum round duct sheet metal gauge shall be as follows:
 - 1. Diameter 3 through 14 inches: Spiral Seam Gauge = 26, Longitudinal Seam Gauge = 24.
- E. Fittings for duct construction shall be of sheet metal gauges as follows:
 - 1. Duct Diameter/Major Dimension 3 through 14 inches: Spiral Seam Gauge = 24, Longitudinal Seam Gauge = 20.

2.05 METAL DUCT HANGERS AND SUPPORTS

- A. Support horizontal ductwork runs with suitable strap or trapeze hangers on 6 foot centers. Where duct weight for the 6 foot length is less than 40 pounds, space hangers 8 feet on center. Support vertical risers at floors with galvanized steel angles riveted to duct on all sides. Size of angles shall be one gage heavier than the ductwork it is supporting.
- B. Ductwork may be supported using load rated cable suspension system equal to Gripple Hang-Fast system. Suspension system shall have a specified manufacturer's Safe Working Load (SWL) and supplementary safety factor of at least 5 times the SWL.
 - 1. Suspension system shall be verified by SMACNA Testing and Research Institute to be in compliance with SMACNA Duct Construction Standard Guidelines (1995 Ch 4).
 - 2. Support ductwork at 6' on center for all round supply 22 inch in diameter or equivalent square and over. For all supply over 20" support on 6 ft centers.
 - a. Mechanical contractor shall consult hanger manufacturer sizing chart for proper hanger sizing based on supported weight.
 - 3. The "Clutcher" cable hanging system manufactured by Ductmate is not an acceptable product and shall not be used.

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. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- D. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Use crimp joints with bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- G. Connect flexible ducts to metal ducts with adhesive tape and draw bands.
- H. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- I. Ducts shall be installed substantially as indicated on the Drawings. However, where conflicts occur with other trades, the Architect/Engineer reserves the right to require the Contractor to make minor changes in duct locations without extra cost to the Owner.

- J. Locate ductwork within walls, ceilings, utility or pipe spaces, chases, joist spaces, and the like, insofar as is practical and so that such Work will be properly concealed.
- K. Support horizontal ductwork runs with suitable strap or trapeze hangers on 6 foot centers. Where duct weight for the 6 foot length is less than 40 pounds, space hangers 8 feet on center. When weight of duct between hangers does not exceed 60 pounds, hangers shall be 1 inch wide by 18 gauge. For greater weights, use trapeze hangers 6 feet on center, as approved by Architect/Engineer. Support vertical risers at floors with galvanized steel angles riveted to duct on all sides. Size of angles shall be one size heavier than scheduled for stiffer angles.
- L. Pack and caulk around ductwork passing through walls and floors where required to prevent sound transmission using fiberglass packing and metal collar.
 - 1. Connect to walls with galvanized angles anchored to wall and construction. Seal angles using approved sealant compound.
- M. Seal ductwork connections to exterior wall louvers using waterproof silicone or polyurethane sealant.
- N. Clean interior of ductwork, leaving it free of loose material and construction debris.
- O. At exterior wall louvers, seal duct to louver frame and install blank-out panels. Slope bottom of ductwork down to louver to allow rain, snow, etc. to run out of ductwork.
- P. Install suspension system in accordance with manufacturer's requirements. Installation instructions shall be provided with fabric duct system by unit manufacturer.

3.02 TESTING AND REPAIR

3.03 SCHEDULES

- A. Ductwork Material:
 - 1. General Exhaust: Galvanized Steel.
 - 2. Shower/Locker room: Aluminum
 - 3. Outside Air Intake: Galvanized Steel.

END OF SECTION

**SECTION 23 34 23
HVAC EXHAUST FANS**

PART 2 PRODUCTS

1.01 MANUFACTURERS

- A. Greenheck:
- B. Loren Cook Company:
- C. Twin City Fan Co.
- D. PennBarry:
- E. Fantech[_____].
- F. Acme Engineering and Manufacturing Corp.

1.02 SIDEWALL EXHAUSTERS

- A. Fan Unit: Direct driven with galvanized housing with powder coated cover; permanently lubricated motor; 1/2 inch mesh, 0.062 inch thick aluminum wire bird screen.
- B. Backdraft Damper: spring-loaded butterfly damper with EPDM sythetic rubber gasket and stainless steel torsion spring.

1.03 CEILING EXHAUST FANS

- A. Centrifugal Fan Unit: V-belt or direct driven as indicated with galvanized steel housing lined with acoustic insulation, resilient mounted motor. Backdraft damper to be provided by the unit manufacturer. Refer to section 23 3300 for backdraft damper requirements.
- B. Disconnect Switch: Unit shall be provided with a factory mounted disconnect switch (UL approved), belt guard, unit mounted solid state speed controller for direct drive units.
- C. Grille: Molded white plastic.
- D. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
- E. Belts and Drives: Where required, belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150 percent of the installed motor horsepower. The variable pitch motor drive must be factory set to the specification fan RPM. Automatic belt tensioner shall be provided with all belt drive fans.
- F. Direct Drive Fans: Provide a Fan Speed controller.
 - 1. Fan speed controller shall be mounted directly at exhaust fan and be used for balancing purposes only.

PART 3 EXECUTION

2.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Hung Cabinet Fans:
 - 1. Install fans with spring isolators and flexible electrical leads. Refer to Section 23 0548.
 - 2. Install flexible connections specified in Section 23 33 00 between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- C. Provide sheaves required for final air balance.
- D. Install backdraft dampers on inlet to roof and wall exhausters.

E. Provide backdraft dampers on outlet from cabinet and ceiling exhausters fans and as indicated.

END OF SECTION

**SECTION 23 37 10
EXTERIOR WALL LOUVERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Thin line wall louvers

1.02 RELATED REQUIREMENTS

- A. Section 23 3100 HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; Air Movement and Control Association International, Inc.
- B. SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible; Sheet Metal and Air Conditioning Contractor's National Association.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Submittals of units noting the size, material, performance and exactness to specification shall be required.
- C. Shop drawings of louvers and color selection must be approved by the Architect/Engineer before fabrication of louvers is started.
- D. Submit three sets of color samples for selection by architect.

1.05 QUALITY ASSURANCE

- A. Units shall meet or exceed the requirements and quality of the components herein specified and as denoted on the Drawings.
- B. No dissimilar metals, which might induce electrolysis, shall be used in the construction, screenings, or mounting of the louvers.
- C. All published ratings shall be based on testing in accordance with AMCA Standard 511.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Ruskin
- B. Louvers and Dampers, Inc..
- C. American Warming and Ventilating, Inc.
- D. Greenheck.
- E. United Enertech.
- F. Dowco.
- G. Air Balance
- H. Industrial Louvers, Inc
- I. Pottorff
- J. Substitutions: See Section 01 6000 - Product Requirements.

2.02 THIN LINE WALL LOUVER-TYPE - HORIZONTAL

- A. Aluminum construction.
- B. Maximum pressure drop of 0.3 inch S.P. at 1000 FPM free area velocity.
- C. Aluminum insect screen tightly stretched and suitable braced to prevent sagging.

- D. Frame shall be constructed of 6063T5 extruded aluminum of .060 inch nominal wall thickness.
- E. Blades shall be constructed of 6063T5 extruded aluminum of .060 inch nominal wall thickness. Thin line style blades to be positioned at approximately a 30 degree angle on 3/4 inch centers.
- F. Box frame mounting shall be used throughout with corners mitered and continuously heliarc welded. Fastenings shall be aluminum or stainless steel.
- G. Finish shall be factory applied baked enamel to color as selected by Architect.
- H. Thin line louvers shall be equal to Ruskin ELF211D, Greenheck EHH-201.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install wall louvers where denoted and as detailed on the Drawings.
- B. Sheet Metal Contractor to verify sizes of wall louvers required prior to ordering.
- C. Fasten ductwork (where required) to the louver perimeter. Bottom of ductwork shall be sloped up minimum of 30 degrees toward inside of building to control entry of water. Seal joints with silicone or polyurethane sealant.
- D. Install drip pans as detailed and in locations noted on drawings.
- E. Install in accordance with manufacturer's instructions.

END OF SECTION

**SECTION 23 82 00
CONVECTION HEATING AND COOLING UNITS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electric cabinet unit heaters.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 83 - EQUIPMENT WIRING: Electrical characteristics and wiring connections. Installation of room thermostats. Electrical supply to units.

1.03 REFERENCE STANDARDS

- A. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications Most Recent Edition Cited by Referring Code or Reference Standard.
- B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 674 - Electrical Motors and Generators for Use in Hazardous (Classified) Locations Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide typical catalog of information including arrangements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 ELECTRIC CABINET UNIT HEATERS

- A. Manufacturers:
 - 1. INDEECO (Industrial Engineering and Equipment Company); [____]: www.indeeco.com/#sle.
 - 2. Marley Engineered Products; [____]: www.marleymep.com/#sle.
 - 3. Raywall.
- B. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.
- C. Heating Elements: Provide open-wire, finned tubular, resistance wire enclosed in steel sheath, or [____].
- D. Cabinet: Minimum 18 gage, 0.0478 inch thick steel front panel with exposed corners and edges rounded, easily removed panels, glass fiber insulation and integral air outlet, and inlet grilles.
- E. Finish:
 - 1. Factory applied, painted finish.
 - 2. Color: As selected from color chart.
- F. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.
- G. Motor: Tap wound multiple speed permanent split capacitor with sleeve bearings, resiliently mounted.

- H. Controls:
 - 1. Thermal cutout with automatic reset to de-energize electric heating elements in the event of overheating.
 - 2. Thermostat.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are suitable for installation.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's recommendations.
- B. Do not damage equipment or finishes.
- C. Cabinet Unit Heaters:
 - 1. Install as indicated.
 - 2. Coordinate to ensure correct recess size for recessed units.
- D. Units with Electric Heating Elements:
 - 1. Install as indicated including electrical devices furnished by manufacturer but not factory installed.
 - 2. Install wiring in accordance with the manufacturer's wiring diagram submittal and Section 26 05 83.

3.03 CLEANING

- A. After construction and painting is completed, clean exposed surfaces of units.
- B. Vacuum clean coils and inside of units.
- C. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.

END OF SECTION

**SECTION 26 01 01
GENERAL PROVISIONS**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.
- B. Refer to Section 01 11 00 - Summary of Work.
- C. Refer to Division 23 Mechanical Specifications and to the requirements stated therein applicable to the Electrical Work, where coordination of trades is covered.
- D. The requirements of this Section shall apply to Work for Sections listed under Division 26, Electrical.

1.02 SUMMARY

- A. When equipment furnished for or by the Owner is indicated on the Drawings or specified, this Contractor shall provide the proper size switches, conduit, wires, boxes, and fittings that may be required; and make connections complete. This Contractor shall verify exact requirements and locations before installation.
 - 1. Boxes, raceways, fittings and the like required by this contractor or any subcontractor hired by this contractor shall be coordinated by this contractor prior to footer, floor, wall, etc. types of construction for correct size
- B. If the equipment, other than that which the Drawings were designed around, does not properly adapt itself to the space allotted or lend itself accessible for repair and maintenance, the Contractor shall be responsible to provide additional access panels, pipe, fittings, materials, and labor, to achieve the same end results.
- C. Electrical support from bar joists shall be allowed only at panel points in top of bottom cords.
 - 1. Loading shall not exceed 5 pounds/S.F. or 100 pounds per panel point applied at the panel point.
 - 2. If support must occur between panel points, then threaded rods shall be dropped from both panel points, an adequate angle attached to both, and then the support attached to the angle as required.
 - 3. Suspension wires, straps, and chains such as those used to support electrical fixtures or equipment shall not be attached to or through steel roof decks.
- D. The Contractor shall take field measurements necessary for his Work and shall be responsible for the accurate location and size of openings, recesses, slots, ferrules, and the like.
- E. The Contractor shall be required to cooperate with "Other Trades" and other Contractors in the coordination of his Work to avoid interferences with installations by other trades and Contractors.
- F. Should structural difficulties prevent the setting of cabinets or running of conduits, at points shown on Drawings, necessary minor deviations therefrom, as determined by the Architect/Engineer, may be permitted and shall be made without additional costs.
- G. Extra costs which might result from deviations from the Drawings, so as to avoid interferences, shall be considered a "Job Condition" and no additional compensation will be considered applicable. In the event that such interferences occur in course of the Work, due to an error, omission, or oversight by the Contractor, no additional compensation shall be allowed. Interferences which may occur during the course of construction shall be brought to the immediate attention of the Architect/Engineer, and his decision, confirmed in writing, shall be final.
- H. Installation of surface mounted trough type raceway above or below switchgear, distribution panels, and/or panelboards shall be approved by engineer prior to installation.

1.03 REFERENCES

- A. Work shall be in complete accordance with codes, rules, ordinances, regulations of authorities, bodies, associations, and governments, having proper and legal jurisdiction. Specifically, the following requirements shall be met in their entirety.
 - 1. State and Local Rules, Regulations, Codes, Statutes, and Ordinances
 - 2. National Fire Protection Association applicable requirements
 - 3. National Board of Fire Protection
 - 4. National Electrical Code applicable requirements
 - 5. Other Codes and Standards as specifically noted in each Section of the Specifications
- B. Electrical equipment shall be Underwriter's approved; also, shall meet requirements established by NEC, NEMA, and ANSI and as specified hereinafter.
- C. Abbreviations of authorities used in these Specifications:
 - 1. NEC National Electrical Code Latest Edition adopted by the National Fire Protection Association
 - 2. NEMA National Electrical Manufacturers Association
 - 3. OSHA Occupational Safety and Health Act
 - 4. IES Illuminating Engineering Society Standards
 - 5. IPCEA Insulated Power Cable Engineers Association
 - 6. ANSI American National Standards Institute, Inc.
 - 7. FCC Federal Communications Commission
 - 8. EIA Electronic Industries Association
 - 9. NAB National Association of Broadcasters
 - 10. NAEB National Association of Educational Broadcasters
 - 11. CBM Certified Ballasts Manufacturers
 - 12. ITL Independent Testing Laboratories
 - 13. ETL Electrical Testing Laboratories
 - 14. UL Underwriters Laboratories
 - 15. DLC Design Light Consortium
 - 16. NICET National Institute for Certification in Engineering Technologies

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Submit shop drawings and illustrations in accordance with requirements of Section 01 30 00 - Administrative Requirements.
- C. Shop Drawings (By Contractor)
 - 1. Where limited space is available due to the nature of the Work, the requirements for shop and working drawings will apply and the Contractor is required to prepare complete shop drawings showing the exact disposition of apparatus, equipment, conduit, and the like, and its relation to the building so there will be no irregularities or interferences on this account. Shop drawings shall be prepared after coordination with other Contractors and other trades.
 - 2. Shop drawings will not be required to be submitted for review by the Architect/Engineer, unless expressly required herein, but may be submitted when not expressly required, at the option of the Contractor.

PART 2 EXECUTION

2.01 EXPLANATION AND PRECEDENCE OF DRAWINGS

- A. For purpose of clearness and legibility, the Electrical "E" drawings are essentially diagrammatic and, although size and location of equipment are closely drawn to scale whenever possible, each Contractor shall make use of the data in all of the Contract Documents and shall verify this information at the building site.

- B. The Drawings indicate required size and points of termination of wiring and other related items and they may suggest proper routes for such items to conform to structure, avoid obstructions, and preserve clearances. It is not intended that Drawings indicate every necessary offset, and it shall be the Work of the Contractor to install each item in a manner as to conform to structure, avoid obstructions, preserve headroom, and keep opening and passageways clear, without further instructions or costs to the Owner.
- C. It is intended that apparatus be located symmetrical with architectural elements and shall be installed at exact height and location stipulated.
- D. The Contractor shall fully inform himself regarding peculiarities and limitations of the spaces available for the installation of work and materials provided under his Contract. He shall exercise due and particular caution to determine that parts of his work are made quickly and easily accessible.
- E. The Contractor shall carefully examine existing conditions, existing wiring, and other materials on the premises and compare the Drawings to the existing conditions. Variances and necessary changes shall be adjusted by appropriate modifications.

2.02 PERMITS, FEES, REGULATIONS, AND INSPECTIONS

- A. Unless specifically noted otherwise, the Contractor shall arrange and pay for permits, fees, and inspections required in connection with his work.
- B. Work shall be inspected by approved local and state inspection bureaus, Electrical Inspection Agency or authority, and electric utility.
- C. Upon completion of the Work, the Contractor shall furnish to the Architect/Engineer a certification of inspection and approval from said Bureau or Agency before final payment on contract will be allowed.

2.03 PERMANENT UTILITY CONNECTIONS

- A. The Contractor shall make his own arrangements with the utility companies for connection of the permanent utilities.

2.04 HOISTS, RIGGING, TRANSPORTATION, AND SCAFFOLDING

- A. The Contractor shall provide scaffolding, staging, cribbing, tackle, hoists, and rigging necessary for placing of his materials and equipment in their proper places in the Project. Temporary work shall be removed from the premises when its use is no longer required on the job.
- B. The Contractor shall pay costs for transportation of materials and equipment to the jobsite and shall include such costs in his proposal.
- C. Scaffolding and hoisting equipment shall comply with requirements of pertinent Federal, State, and Local Laws and Codes.

2.05 PROTECTION

- A. In addition to other requirements of the Contract, the Contractor shall provide various types of protection as follows:
 - 1. Protect finished floors from chips and cutting oil by the use of metal chip receiving pan and an oil proof floor cover.
 - 2. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
 - 3. Protect equipment, finished surfaces from paint droppings, insulation adhesive, and sizing droppings by use of drop cloths.
- B. Light fixtures and other electrical equipment shall be stored at the site with openings and bearings covered to exclude dust and moisture. Stockpiled pipe shall be placed on dunnage and protected from weather and from entry of foreign material.
- C. The Contractor shall be responsible for the protection of finished work of other trades from damage or defacement by his operations and shall remedy such damage at his own expense.

2.06 EMERGENCY REPAIRS OR OPERATION

- A. The Owner reserves the right to make emergency repairs and protection of the equipment and systems in operation without voiding the Contractor's guarantee bond or relieving the Contractor of his responsibility during the bonding period.

2.07 PROVISIONS FOR LATER INSTALLATIONS

- A. Where Work cannot be installed as the structure is being erected, the Contractor for such Work shall provide and arrange for the building-in of boxes, sleeves, inserts, fixtures, and devices necessary to permit installation of the omitted work during later phases of construction. The Contractor shall arrange for layout, chases, holes, and other openings which must be provided in masonry, concrete, and other work.
- B. The Contractor shall be responsible for informing himself of the nature and arrangement of the materials and constructions to which his work attaches or passes through.

2.08 DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEM

- A. Provide a minimum of 2 hours total instruction to personnel selected by the Owner. Instructions shall include the following:
 - 1. Show equipment locations and explain how the various systems function, including: power system and lighting controls.
 - 2. Refer to operating instructions manual for record and clarify.
 - 3. Coordinate written and verbal instructions so that each is understood by personnel.
- B. Provide additional instructions to Owner's personnel as stipulated in other subsections of Division 26.

2.09 FINAL COMPLETION

- A. Work shall be cleaned prior to Substantial Completion of the Work.
- B. Retouch or repaint factory painted prime and finish coats, where scratched or damaged. Whenever retouching will not be satisfactory, in the opinion of the Architect/Engineer, the Architect/Engineer has the option to require complete repainting until the desired appearance is obtained.
- C. Remove temporary wiring as soon as permanent system(s) or portions thereof are in operating condition and have been inspected and approved.
- D. Lamps, fixtures, lenses, and reflectors shall be cleaned by the Contractor no sooner than 10 days prior to Substantial Completion of the Work.
- E. The Contractor shall clean equipment; restore damaged materials; remove grease, oil, chemical, paint spots, and stains.
- F. On completion of his Work, the Contractor shall remove and see that each of his subcontractors removes from the site tools, equipment, surplus materials, and rubbish pertaining to his operations, and pay costs for such removal and disposition.

2.10 CUTTING AND PATCHING

- A. The Contractor shall do cutting and patching of building materials and piping, as required for the installation of his Work, but no structural members shall be cut without the approval of the Architect and such cutting shall be done in a manner directed by the Architect.
- B. Patching of and repair of damage to Work in place shall be done in a neat and workmanlike manner, meeting with the approval of the Architect. Contractor whose operations require cutting of work in place, or who causes damage which entails repairs of such work, shall employ mechanics of the particular trade whose work must be cut or which is damaged, and shall pay the costs of such patching or repair.
- C. Conduits penetrating masonry walls shall not interrupt the vertical masonry wall reinforcing. Coordinate the location of reinforcement with Division 4. Wherever more than 2 conduits 2

inches or larger are to pass through a masonry wall in the same location or where conduits of any size in a row equals a length of 3 feet or greater, prior approval from the Architect shall be required before disturbing the wall. Wherever multiple conduits pass through masonry walls provide a minimum of 4 inches between adjacent penetrations.

- D. The Contractor shall caulk around all conduit penetrations in non-fire rated wall with sealant.

2.11 GUARANTEE AND WARRANTY

- A. The Contractor shall submit his and each equipment manufacturer's written certificates, warranting that each item of equipment furnished complies with the requirements of the Drawings and Specifications. The electrical system shall be warranted for one year from the date of substantial completion.

2.12 SUPERVISION AND COOPERATION

- A. Work done by the Contractor under this Division shall include the services of an experienced superintendent, who shall be constantly in charge of the Work, together with the qualified journeymen, helpers, and laborers required to properly unload, install, connect, adjust, start and operate, and test the Work involved, including related equipment and materials furnished under other contracts or by the Owner.

2.13 MAINTENANCE AND OPERATING MANUALS AND INSTRUCTIONS

- A. Bind the written operating instructions, shop drawings, equipment catalog cuts, and manufacturer's instructions into the binder. Material to be assembled as follows:
1. First Page - Title of Job, City of Greenville, Building Name, 122 Martin St., Date of Submittal, Name of Contractor, and Garmann / Miller & Associates Inc. Emergency operating instructions and/or list of service organizations (including address and telephone numbers) capable of rendering emergency service on 24 hour calls.
 2. Second Page - Index
 3. Third Page - Introduction to first section containing a complete written description of the system.
 4. First Section - Written description of system contents, where actually located in building, how each part functions individually, and how system works as a whole. Conclude with a list of items requiring service and either state the service needed or refer to the manufacturer's data in the binder that described the proper service.
 5. Second Section - A copy of each approved shop drawing (clearly marked for item furnished), with an index at the beginning of the section. Provide a separate list of lighting fixtures used on the job; list shall include, but not be limited to: Plan type, manufacturer's catalog number, and voltage, number of lamps, lamp type, ballast catalog number, manufacturer's name and quantity (when required), catalog number and quantity of any replacement glass and plastic parts.
 6. Third Section - A copy of each manufacturer's operating instructions with an index at the beginning of the section.
 7. Fourth Section - A list of equipment used on the job, Contractor's purchase order numbers, supplier's name and address.
- B. One (1) electronic copy of the Operation and Maintenance Manuals shall be placed on a Thumb Drive, or other form of Mass Storage Device, for the Owners use. Files must be in a PDF format or format approved by the Owner.
1. PDF shall be indexed/bookmarked to allow a quick search to the relevant material.

2.14 RECORD DRAWINGS

- A. The Contractor shall keep a running record of each change and deviation from the Drawings. Records shall be kept clean and undamaged upon a set of drawings used for no other purpose. Upon completion of the Project, the Contractor shall submit to Garmann / Miller & Associates Inc. one complete set of Drawings which have been corrected to show deviations. With the submittal shall be 2 sets of prints made from the corrected Drawings for a total of 3 sets of record (as-built) drawings.

- B. Record Drawings shall show:
1. Size, type, and capacity of materials, devices, or pieces of equipment.
 2. Location of devices or pieces of equipment.
 3. Location of outlets or sources in building service systems.
 4. Routing of piping, conduit, ducts, or other building services.
 5. Actual circuit number.
 6. Actual luminaires (by manufacturer catalog number) installed.
 7. Building plan and devices shall be a scale of original construction documents.
 8. These drawings shall also record the location of concealed electric service, conduit, and other piping by indication of measured dimensions to each such line from readily identifiable and accessible walls or corners of the building.
 9. Record drawings must be complete and accurate with regard to concealed conduit, raceways, wiring, and like equipment or devices. Unless record drawings are sufficiently accurate to permit immediate location and identification of concealed work with a minimum of cutting, record drawings will be considered inadequate and the contract work deemed incomplete.
- C. One (1) electronic copy of the Record Drawings shall be placed on a Thumb Drive, or other form of Mass Storage Device, for the Owners use. Files must be in a PDF format or format approved by the Owner.

END OF SECTION

**SECTION 26 05 05
MINOR ELECTRICAL DEMOLITION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as indicated.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation.
- D. Report discrepancies to Garmann / Miller & Associates Inc. before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company. It is the Electrical Contractor's responsibility to provide all site electrical disconnections required for demolition. Coordinate this work with the General Contractor.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Obtain permission from City of Greenville at least 24 hours before partially or completely disabling system.
 - 2. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed.
- D. Disconnect and remove abandoned panelboards and distribution equipment.
- E. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- F. Repair adjacent construction and finishes damaged during demolition and extension work.
- G. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- H. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

- A. See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.
- B. Clean and repair existing materials and equipment that remain or that are to be reused.
- C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

END OF SECTION

**SECTION 26 05 06
TEMPORARY WORK**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.

1.02 SUMMARY

- A. Except when otherwise stipulated, completed portions of the permanent installation or materials for use in the permanent installation shall not be used in temporary work without specific permission.
 - 1. Installed raceways for the permanent installation may be utilized for installation of temporary wiring.
- B. Overload protection and grounding for circuits and equipment of the temporary light and power system shall comply with applicable codes relating to permanent work. Panelboards and other protective equipment shall be furnished and installed as required by field conditions.
- C. Contractor shall locate temporary electric service main disconnect in an approved enclosure with lock. Upon request, contractor shall arrange to daily disconnect electric power on load side of "Main(s)" and lock the enclosure(s) containing same. Solid grounding of the temporary electric service is required.
- D. Provide ground fault interrupter circuit breakers for branch circuits in accord with codes and regulations, including "OSHA" and "IOSHA".
- E. Lighting fixtures employed shall be of the type, quality, and quantity required to provide a temporary lighting system in accord with codes and regulations, including "OSHA" and "IOSHA", and same shall not be on the same circuits with receptacle and other devices.
- F. Upon request, the Contractor shall submit shop drawings and detail information for temporary service and distribution to the Architect/Engineer for approval.

END OF SECTION

SECTION 26 05 19 CONDUCTORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal-clad cable.
- B. Wire and cable for 600 volts and less.
- C. Wiring connectors.
- D. Electrical tape.
- E. Oxide inhibiting compound.
- F. Wire pulling lubricant.
- G. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 05 - MINOR ELECTRICAL DEMOLITION : Disconnection, removal, and/or extension of existing electrical conductors and cables.
- B. Section 31 23 16 - Excavation.
- C. Section 31 23 16.13 - Trenching: Excavating, bedding, and backfilling.
- D. Section 31 23 23 - Fill: Bedding and backfilling.

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 2011 (Reapproved 2017).
- 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 B800 - Standard Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes - Annealed and Intermediate Tempers 2005 (Reapproved 2021).
- F. ASTM B801 - Standard Specification for Concentric-Lay-Stranded Conductors of 8000 Series Aluminum Alloy for Subsequent Covering or Insulation 2018.
- G. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2017.
- H. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- I. NECA 104 - Standard for Installing Aluminum Building Wire and Cable 2012.
- J. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable 2018.
- K. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2021.
- L. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- M. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- N. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.
- O. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.

- P. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.
- Q. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.
- R. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.
- S. UL 1569 - Metal-Clad Cables Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - 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. Design Data: Indicate sizing for aluminum conductors substituted for copper conductors. Include proposed modifications to raceways, boxes, wiring gutters, enclosures, etc. to accommodate substituted conductors.
- 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. Project Record Documents: Record actual installed circuiting arrangements. Record actual routingall conduits 2" and larger and all underground conduits.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE MANUFACTURERS

- A. Cerro Wire & Cable Company.
- B. Encore Wire Corporation: www.encorewire.com.
- C. Industrial Wire & Cable, Inc: www.iewc.com.
- D. Southwire Company .
- E. Alcan Cable
- F. Phelps Dodge
- G. Substitutions: See Section 01 6000 - Product Requirements.

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. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:
 - 1. Provide copper conductors except where aluminum conductors are specifically indicated. Substitution of aluminum conductors for copper is not permitted. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
 - 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.
- 4. Aluminum Conductors (only where specifically indicated or permitted for substitution): AA-8000 series aluminum alloy conductors recognized by ASTM B800 and compact stranded in accordance with ASTM B801 unless otherwise indicated.
- H. Minimum Conductor Size: 12 AWG.
 - 1. Control Circuits: 18 AWG.
- I. 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.
 - 3. Color Code:
 - a. 240/120 V, 1 Phase, 3 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Neutral/Grounded: White.
 - b. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Conductor Stranding:
 - 1. Feeders and Branch Circuits: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
 - a. Size 4 AWG and Larger: Type XHHW-2.
 - b. Installed Underground: Type XHHW-2.
 - 2. Aluminum Building Wire (only where specifically indicated or permitted for substitution): Type XHHW-2.

2.04 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: Stranded or solid.
- 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: Aluminum or steel, interlocked tape.

2.05 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. Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
 - 3. Connectors for Aluminum Conductors: Use compression connectors.
- C. Wiring Connectors for Terminations:

1. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
 2. Aluminum Conductors: Use compression connectors or mechanical connectors for all connections.
 3. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
- D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
 - E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
 - F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
 - G. Mechanical Connectors: Provide bolted type or set-screw type.
 - H. Compression Connectors: Provide circumferential type or hex type crimp configuration.
 - I. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

2.06 ACCESSORIES

- A. Electrical Tape:
 1. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
- B. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
- C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
- D. Cable Ties: Material and tensile strength rating suitable for application.
- E. Split Bolt Connectors.
- F. Solderless Pressure Connectors.
- G. Spring Wire Connectors.
- H. Compression Connectors.

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.
- D. Verify that raceway installation is complete and supported.
- E. Verify that field measurements are as indicated.
- F. 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. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install aluminum conductors in accordance with NECA 104.
- D. Install metal-clad cable (Type MC) in accordance with NECA 120.
- E. 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.
- F. 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.
- G. 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.
 - c. Do not use direct-bearing set-screw type fittings for cables with aluminum armor.
- H. Install conductors with a minimum of 12 inches of slack at each outlet.
- I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- J. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- K. 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 suitable remove corrosion, oxides, and other contaminants. Do not use wire brush on plated connector surfaces.
 - 5. Connections for Aluminum Conductors: Fill connectors with oxide inhibiting compound where not pre-filled by manufacturer.
 - 6. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 7. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- L. 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.
- M. Insulate ends of spare conductors using vinyl insulating electrical tape.
- N. 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.

- O. In general, install EMT conduit for branch circuits throughout the building. EMT to junction box in room for lighting circuits. MC cable may be used from junction box to light fixtures. MC cable may also be used in metal stud walls for receptacles, but EMT shall still be used from the panel to a junction box in the room, between junction boxes above ceiling, and between each wall stub-out location.
- P. Include an equipment ground conductor with each circuit.
- Q. Provide dedicated neutrals for all circuits. Do not share neutrals.
- R. Wire and cable routing indicated is approximate unless dimensioned.
- S. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.
- T. Install wire and cable in accordance with the NECA "Standard of Installation."
- U. Protect exposed cable from damage.
- V. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.
- W. Use suitable cable fittings and connectors.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, 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 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
- D. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

**SECTION 26 05 26
GROUNDING AND BONDING**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.
- B. Refer to 01 23 00 - Alternates for Alternates that may affect the Work of this Section.

1.02 SUMMARY

- A. Provide a complete grounding system which shall be in accordance with the National Electric Code, State and Local Ordinances, and utility company requirements, and as indicated on the Drawings.

1.03 QUALITY ASSURANCE

- A. Grounding shall be in accord with NEC, Article 250, and others which apply. Equipment shall be provided with a suitable ground lug, except for distribution equipment (switchboards, panels, and the like) which shall be provided with a suitable ground bus.
- B. UL 467
- C. Bare solid copper conductors ASTM B3
- D. Bare stranded copper conductors ASTM B8
- E. Underground distribution components IEEE C2

PART 2 PRODUCTS

2.01 MATERIALS

- A. Grounding connection "make-up" shall be with Erico Products Company "Cadweld", Burndy "Thermoweld", Harger "Ultraweld", or 3M of the type required at locations where a ground bus, lug, or connector is not stipulated.
- B. Minimum 12 AWG 600V insulated copper equipment grounding conductor insulated with green colored insulation.
- C. Stranded cable grounding electrode conductors.
- D. Bare copper conductors.
- E. Copper clad steel 3/4" grounding rods.
- F. Grounding bus consisting of bare annealed 1/4 inch by 2 inch copper bars of rectangular cross section.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The following requires permanent grounds: Electrical service equipment and enclosures, conduits, and other conductor enclosures; neutral or identified conductor of interior system, power and lighting panelboards; noncurrent carrying metal parts of fixed equipment, such as motors, instrument cases, lighting fixtures, switches, receptacles; and others as indicated and/or required by NEC.
- B. System neutral conductor shall be identified throughout and shall be grounded at the point of service only.
- C. Metallic conduit shall be electrically continuous throughout and be grounded (bonded) at the service entrance. Feeder conduits (one inch and larger) shall also be grounded at pull boxes, junction boxes, cabinets, and terminal points using grounding knockouts and bushings, to the equipment grounding bar or lugs.

- D. Cord connected appliance frames shall be grounded to the system grounding conductor and to the conduit system through a grounding conductor in the cord.
- E. Flexible conduit connections to equipment and motors, and the like, shall have an equipment grounding conductor, size per NEC 250.
- F. A green pigtail shall be installed from grounding slots of grounding outlets to system grounding conductor and to outlet box in each instance.
- G. A green pigtail shall be installed from the attachment bar of toggle switches to system grounding conductor and to outlet box.
- H. Green bonding jumper shall be installed in flexible metallic conduit, size per NEC 250.
- I. Provide a grounding conductor, sized per NEC 250 from the ground bus at the service entrance to each side of any cold water meter; to the reinforcing bars of the concrete structure; to building; to the steel structure of the building. Similarly jumper the steel structure at building expansion joints, and "catwalks" to the steel structure.
- J. Provide grounding of structural steel as denoted on the accompanying Drawings.
- K. A separate equipment grounding conductor, sized in accord with NEC 250 shall be installed with each and every conduit and shall be attached to ground bars, lugs, equipment, frames, devices, pull boxes, junction boxes, outlet boxes, and the like.
- L. Conduit is not an allowable grounding means.

3.02 TESTING

- A. The contractor must test the primary earth ground and provide the testing results to the Engineer. The resistance shall be 5 ohms or less. If the value tested is greater than 5 ohms, additional ground rods shall be added until the test reading is 5 ohms or less.

END OF SECTION

**SECTION 26 05 29
HANGERS AND SUPPORTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.
- B. Conduit and equipment supports.
- C. Anchors and fasteners.

1.02 RELATED REQUIREMENTS

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 2019.
- 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.

1.04 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. 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. 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.
 - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - 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.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.

- 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. 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. Comply with MFMA-4.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

2.02 MANUFACTURERS

- A. Threaded Rod Company
- B. All-Ohio Threaded Rod Company
- C. Precision Brand
- D. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 MATERIALS

- A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Supports: Fabricated of structural steel or formed steel members; galvanized.
- C. Anchors and Fasteners:
 - 1. Concrete Structural Elements: Use precast inserts, expansion anchors, or preset inserts.
 - 2. Steel Structural Elements: Use beam clamps, steel spring clips, steel ramset fasteners, or welded fasteners.
 - 3. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
 - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
 - 5. Solid Masonry Walls: Use expansion anchors or preset inserts.
 - 6. Sheet Metal: Use sheet metal screws.
 - 7. Wood Elements: Use wood screws.
 - 8. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by 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. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.
- J. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
 2. Obtain permission from Architect before drilling or cutting structural members.
- K. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- L. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- M. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch off wall.
- N. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION

**SECTION 26 05 33.13
CONDUIT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Intermediate metal conduit (IMC).
- C. Flexible metal conduit (FMC).
- D. Liquidtight flexible metal conduit (LFMC).
- E. Electrical metallic tubing (EMT).
- F. Rigid polyvinyl chloride (PVC) conduit.
- G. Conduit fittings.

1.02 RELATED REQUIREMENTS

- A. Section 09 91 23 - Interior Painting
- B. Section 26 05 26 - GROUNDING AND BONDING.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- C. Section 26 05 29 - HANGERS AND SUPPORTS.
- D. Section 26 05 53 - IDENTIFICATION.
- E. Section 26 05 33.16 - BOXES.

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. ANSI C80.5 - American National Standard for Electrical Rigid Metal Conduit -- Aluminum (ERMC-A) 2020.
- D. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit 2018.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit 2018.
- H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.
- I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2021.
- J. NFPA 70 - National Electrical Code; National Fire Protection Association; Most recent edition adopted by Authority Having Jurisdiction, including all applicable Amendments and Supplements.
- K. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.
- L. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- M. UL 360 - Liquid-Tight Flexible Metal Conduit Current Edition, Including All Revisions.
- N. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.
- P. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.

Q. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide for metallic conduit, flexible metal conduit, liquidtight flexible metal conduit, metallic tubing, nonmetallic conduit, flexible nonmetallic conduit, nonmetallic tubing, fittings, and conduit bodies.
- C. Project Record Documents: Accurately record actual routing of conduits larger than 2 inches.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

PART 2 PRODUCTS

2.01 CONDUIT REQUIREMENTS

- A. Fittings for Grounding and Bonding: Also comply with Section 26 05 26 - GROUNDING AND BONDING.
- B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Coordinate painting requirements with painting contractor where conduits are exposed due to open structure and the like.
- E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- F. Conduit Size: Comply with NFPA 70.
 - 1. Minimum size: 1/2" unless otherwise specified.
- G. Underground Installations:
 - 1. PVC conduit may be used for underground installations. Where underground conduit (2" and larger) passes under a parking lot, driveway, roadway, or the like; encase conduit in concrete.
- H. Outdoor Locations Above Grade: Use rigid steel conduit.
- I. Wet and Damp Locations: Use rigid steel or intermediate metal conduit.
- J. Dry Locations:
 - 1. Concealed: Use rigid steel conduit, intermediate metal conduit, or electrical metallic tubing.
 - 2. Exposed: Use rigid steel conduit, intermediate metal conduit, or electrical metallic tubing.
- K. Where underground conduit enters a room and water entering through the conduit is a concern or an issue, provide a product similar to Raychem Rayflate Duct Sealing System at both ends of conduit to seal conduit air and water tight.

2.02 MANUFACTURERS

- A. Essex Group
- B. Hubbell Power Systems
- C. Hellermann Tyton
- D. Wheatland Tube Company
- E. Allied Tube and Conduit
- F. Cantex Inc.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
 - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
 - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.
- C. Conduit Size: Comply with NFPA 70.

2.05 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.
- C. Description: Interlocked steel construction.

2.06 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.
- C. Description: Interlocked steel construction with PVC jacket.

2.07 ELECTRICAL METALLIC TUBING (EMT)

- A. Thin wall conduit shall be Underwriter's approved electrical metallic tubing (EMT). EMT shall meet Federal Specification WW 806, latest edition.

- 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. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.

2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Nonmetallic conduit shall be Underwriter's approved Schedule 40 heavy wall "PVC" polyvinyl chloride plastic type, properly supported and anchored. Conduit shall be terminated in end-bells or bushings. Provide bonding or grounding conductors in accordance with NEC.
- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- C. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.
- D. Description: NEMA TC 2; Schedule 40 PVC.

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.
- D. Verify routing and termination locations of conduit prior to rough-in.
- E. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3.02 INSTALLATION

- A. In finished rooms with open structure, conduit shall be concealed. If the structure is such that conduit cannot be concealed, the contractor shall review with the Architect and Engineer prior to installation.
- B. 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.
- C. Install EMT conduit for branch circuits throughout the building. EMT to junction box in room for lighting circuits. MC cable may be used from junction box to light fixtures. MC cable may also be used in metal stud walls for receptacles, but EMT shall still be used from the panel to a junction box in the room, between junction boxes above ceiling, and between each wall stub-out location.
- D. Branch circuits may be routed underslab. In no case may conduits be routed within the slab.
- E. PVC conduit may be used for underground installations. Use metal rigid elbows with metal rigid above grade. Fiberglass elbows with zero burn-through, high strength/UV resistant reinforced epoxy may be used for large utility and electrical sweeps in lieu of the rigid. PVC conduits (2 inches and larger) that are routed outside the building under driveways, roadways, sidewalks or the like shall be incased in concrete.

- F. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.
- G. Install nonmetallic conduit in accordance with manufacturer's instructions.
- H. Arrange supports to prevent misalignment during wiring installation.
- I. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- J. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- K. Fasten conduit supports to building structure and surfaces under provisions of Section 26 05 29 - HANGERS AND SUPPORTS.
- L. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- M. Do not attach conduit to ceiling support wires.
- N. Arrange conduit to maintain headroom and present neat appearance.
- O. Route exposed conduit parallel and perpendicular to walls.
- P. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- Q. Maintain adequate clearance between conduit and piping.
- R. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- S. Cut conduit square using saw or pipecutter; de-burr cut ends.
- T. Bring conduit to shoulder of fittings; fasten securely.
- U. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- V. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.
- W. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2 inch size.
- X. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- Y. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic and expansion joints.
- Z. Provide suitable pull string in each empty conduit except sleeves and nipples.
- AA. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- BB. Identify conduit under provisions of Section 26 05 53 - IDENTIFICATION.

END OF SECTION

**SECTION 26 05 33.16
BOXES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Wall and ceiling outlet boxes.
- D. Pull and junction boxes.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 29 - HANGERS AND SUPPORTS.
- B. Section 26 07 26 - WIRING DEVICES:
 - 1. Wall plates.

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.

1.04 SUBMITTALS

- A. Project Record Documents: Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Provide products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

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, 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. 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.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Wall Plates: Comply with Section 26 27 26.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
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:
 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

2.02 MANUFACTURERS

- A. Appleton Electric.
- B. Arc-Co./Division of Arcade Technology: www.arc-co.com.
- C. Unity Manufacturing: www.unitymfg.com.
- D. Hubbell
- E. Thomas and Betts
- F. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
 2. Concrete Ceiling Boxes: Concrete type.
- B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.
- C. Wall Plates for Finished Areas: As specified in Section 26 27 26.

- D. Technology rough-in boxes to be extra deep (min 2-1/2").

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.
- D. Coordinate locations of outlets with other trades prior to rough-in.

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. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 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.
- E. Install boxes plumb and level.
- F. 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 or does not project beyond finished surface.
 - a. For boxes installed in masonry walls, use fittings equal or similar to Raco Block-Loc to hold box flush, plumb and level.
 - 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 at the edge of the box.
- G. Install boxes as required to preserve insulation integrity.
- H. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- I. Close unused box openings.
- J. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- K. Provide grounding and bonding in accordance with Section 26 05 26.
- L. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.
- M. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- N. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.
 - 1. Adjust box locations up to 3 feet if required to accommodate intended purpose.
- O. Orient boxes to accommodate wiring devices oriented as specified in Section 26 2726.

- P. Maintain headroom and present neat mechanical appearance.
- Q. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- R. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- S. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- T. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
- U. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
 - 1. Switch outlets shall be located within 12" of latch side of door opening, nearest to the opening.
- V. Use flush mounting outlet box in finished areas.
- W. Coordinate the installation of flush mounted boxes in masonry walls with the Masonry Contractor to achieve neat openings.
- X. Do not install flush mounting boxes back-to-back in walls; provide minimum 8 inches separation.
- Y. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- Z. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- AA. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- BB. Use adjustable steel channel fasteners for hung ceiling outlet box.
- CC. Do not fasten boxes to ceiling support wires.
- DD. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.
- EE. Use gang box where more than one device is mounted together. Do not use sectional box.
- FF. Use gang box with plaster ring for single device outlets.
- GG. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- HH. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

3.03 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closures in unused box openings.

3.04 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.
- B. Clean exposed surfaces and restore finish.

END OF SECTION

**SECTION 26 05 50
BASIC MATERIALS AND METHODS**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements are included as a part of this Section as though bound herein.
- B. Refer to other Sections of Division 26 for additional detailed material and methods of Specifications.

1.02 SUMMARY

- A. Load Balance and Adjustment
 - 1. The Contractor shall furnish personnel and equipment and insure that building power, lighting, motor, and appliance loads are balanced between phases of service entrances, distribution feeders, and panelboards as closely as possible.
- B. This Contractor shall install rough-in work pertaining to his trade for each item of equipment furnished under another Section of the Specifications or by Owner. The Contractor shall, before bidding the Project, verify exact rough-in requirements before installation with the Contractor, subcontractor, Owner, or supplier furnishing said equipment, who shall furnish dimensional Drawings accurately locating rough-in for his equipment.
- C. The Contractor shall rough-in and connect fixtures, equipment, appliances, and the like, requiring electric services.
- D. Provide sleeves, raceways, conduit, conduit fittings, conductors, fuses, grounding equipment, devices, disconnects, starters, and protective systems required or denoted on Drawings.

1.03 SUBMITTALS

- A. Comply with requirements of Section 01 30 00 and Division 26 Sections.

1.04 QUALITY ASSURANCE

- A. Materials shall be new, complete with manufacturer's guarantee or warranty, and shall be approved by the Underwriters' Laboratories, Inc., if a standard has been established by that agency for the type of material.
- B. Materials shall also comply with applicable standards of the National Electrical Manufacturers' Association, Insulated Power Cable Engineers Association, National Safety Code, and the American Institute of Electrical Engineers. Such standards are hereby made a part of these Specifications.
- C. Work shall be executed in a workmanlike manner and shall present a neat mechanical appearance when completed. Methods and techniques of installation shall be subject to the approval of the Architect.
- D. Materials of the same type or class shall be the product of one manufacturer. For example, panelboards shall be from one manufacturer, lighting switches from one manufacturer.

1.05 PROJECT CONDITIONS

- A. The Contractor shall be responsible for the accurate location of his Work and for informing himself of the nature and arrangement of the materials, equipment, and construction to which his Work attaches or passes through.
- B. In general, piping, conduits, and other work shall be concealed in walls and above ceilings, in utility of pipe spaces, in chases, in joist spaces, in tunnels, in equipment rooms, and the like, insofar as is practical; so that such work will not interfere with the proper coordinated installation work of other trades or Contractors.

- C. In general, piping, conduits, and lines, except those below slabs on grade shall be installed parallel (or at right angles) to the building walls, and at such heights as not to obstruct portions of windows, doorways, stairways, pipe space, tunnel, or passageway, and properly concealed to not interfere with the proper coordinated installation of other trades or Contractors. Where interferences develop in the field, the Work shall be offset or routed as required to clear such interferences. Consult architectural, mechanical, electrical drawings, Contractors, and other details before installing work; and unless otherwise specified, ductwork installation shall take precedence over other crafts, such as piping and conduit as determined by the Architect/Engineer.
- D. Materials installed shall be new and never before used.
- E. The Contractor shall procure definite locations and connections before rough-in or installation. This Contractor shall then lay out his Work and be responsible for determining proper elevations, angles, measurements, and locations required for the installation of his Work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide overcurrent protective devices in accordance with Article 240 of the National Electric Code.
- B. The overcurrent protective devices must be capable of interrupting the amount of short circuit current available at their location as stated in the National Electric Code.
- C. Overcurrent protective devices shall be so selected and coordinated to permit maximum continuity of service and comply with the National Electric Code.

PART 3 EXECUTION

3.01 SITE PREPARATION

- A. Excavation and Backfill - Underground Wiring: The following is supplemental to the requirements of Division 31, Site Construction.
- B. The Contractor shall do excavating of materials encountered, including backfilling, as shown or as necessary for the installation of underground wiring, foundations, and equipment in his Contract. Provide and maintain bracing, shoring, or sheathing necessary to support the walls of excavations.
- C. Trenches shall be opened in straight lines and bottomed out at least 4 inches below conduits or ducts. Exterior trenches shall have a minimum depth of 36 inches which shall be maintained between top of largest conduit or duct and finish grade.
- D. Where roots of live trees are encountered in excavations, they shall be carefully protected during construction. Contractor shall cut or remove interfering trees, remove stumps, and rocks in the line of the excavation; however, approval of the Architect shall be obtained before a tree is removed or cut. Shrubbery in line of excavation shall be removed with a ball of dirt and replaced at completion of installation.
- E. Where excavation is necessary in existing pavements, Contractors for whose work the excavation is required shall pay fees and costs of opening street or pavement and costs of filling and repaving in accordance with requirements of and to the satisfaction of the Municipality, Utility, or other Owners of such paving.
- F. Where existing sidewalks, drives, and roadways must be cut, they shall be cut in straight lines, shall present a neat appearance when relaid and shall match existing work. At such locations the backfill medium shall be concrete from the bottom of the finished surface to the bottom of the trench except as may be otherwise approved by the Architect/Engineer.
- G. Where excavation is necessary in an existing lawn, carefully remove and store sod. After backfilling trench, replace sod or apply top dressing of black dirt and seed to match existing lawn. Care shall be exercised during the work to see that no unnecessary damage is done to

lawns in the storing of dirt or other construction material. Should unnecessary damage occur, in the opinion of the Architect, the Contractor shall be required to recondition lawns at his own expense.

- H. In addition, the Contractor shall provide and maintain warning barricades, flags, and warning lights, and shall conduct his work so as to create a minimum amount of inconvenience to others, traffic, construction, and the like. Temporary suspension of work does not relieve the Contractor of responsibility for the above requirements.
- I. Remove and properly dispose of debris, rubbish, and excavation spoils resulting from the Work, off-site. Obtain necessary permits for dumping.

3.02 FOUNDATIONS AND ANCHOR BOLTS AND CURBS

- A. The Contractor shall provide concrete pad foundations for floor mounted equipment installed under this Section. Pad foundations shall be 3-1/2 inches high minimum, unless otherwise indicated on Drawings. Edges shall be chamfered one inch. Faces shall be free of voids and rubbed smooth with carborundum block after stripping of forms. Tops of pads shall be dead level. Provide short dowel rods into floor for lateral stability and anchorage.
- B. Set equipment anchor bolts in galvanized sheet metal sleeves one inch larger than bolt diameter. Secure each sleeve to a template and secure template to forms.
- C. Machinery bases, bed plates, sole plates, and vibration isolation units shall be carefully aligned, shimmed, and leveled, then grouted in place with Embeco Grout (Master Builders).
- D. For each surface mounted panel, provide a concrete floor curb around conduits which rise from below to the panel. Curb height shall correspond to the finish wall base material, but be not less than 3 inches high. Depth shall suit requirements but be not less than 6 inches deep (wall to face) and provide at least 2 inches concrete cover over the conduits.

3.03 INSTALLATION

- A. Special care shall be taken during load balance to assure that reverse rotation of motors is not caused.
- B. Materials installed under this Division of Work shall be supported from the building structure, independent of other pipe, duct, and equipment, except recessed "lay-in" fixtures not larger than 2 feet by 4 feet size may be supported as stipulated in other Divisions and Sections of Division 26.
- C. Conductors and cables shall be installed in conduit and other specified raceways which have been properly supported and anchored, unless otherwise specified.
- D. The Contractor shall install major and secondary control equipment and erect on approved type brackets or floor supports, located as directed, and make electric connections to major and secondary control equipment and motor or apparatus, complete, and assume full responsibility for the connections.
- E. Install taps and connections in properly selected outlet boxes and junction boxes. Install pull boxes only as required. Enclosures for wiring connections of motor controllers or switches shall not be used as junction boxes for cable tapping or splicing, except where the enclosures are designed to provide space which is suitable, adequate, and approved for the purpose.
- F. Cover and protect equipment, materials, enclosures, boxes, and raceways, before and after installation, to prevent injury and to prevent entrance of grit, dirt, and foreign matter.
- G. Phase, neutral, and ground conductors of a given circuit must be in the same raceway. Circuiting shall be as specified and denoted on the Drawings, with loads balanced as closely as possible across all phase legs.
- H. Make final electrical connections of equipment to rough-ins and the electrical system.
- I. Equip outlets with fittings and outlet boxes adapted to that particular outlet.

- J. Exposed outlets shall be equipped with heavy cast type boxes, such as "FS" and "FSA" type conduits. Exposed raceways in finished spaces shall be wiremold type finished to match adjacent surfaces in which case outlet boxes shall be compatible with the raceway system.
- K. The ends of raceway systems and conduits shall be carefully and securely capped during construction.

3.04 ACCESS DOORS

- A. Locate panels accurately in coordination with the General Construction requirements and as directed by the Architect. Panels are to be provided in nonaccessible ceilings and walls where necessary to provide access to equipment and wiring as required.

3.05 DISCONNECTS

- A. Provide properly sized disconnects for apparatus and equipment whenever disconnecting means is not furnished by others. Each device, apparatus, or equipment must have local disconnecting means within actual sight of the motor or apparatus, and within 49 feet of the same.

3.06 TESTING

- A. Voltage and System Testing, Checking, and Reports
 - 1. The Contractor shall:
 - a. Test and record voltages and ground loop impedance at various outlets.
 - b. Test and determine that system is free of short circuits and other faults.
 - c. Test and record meter reading to ground at various points and devices.
 - d. Test insulation integrity of main service cables, main branch panel feeder cables, switchgear, and transformers for 480 volt service with 1000 volt megger between phases and between each phase and ground with test maintained until readings are steady. Minimum acceptable reading is 50 megohms. Cables for lower voltages to be similarly tested, utilizing 500 volt megger. Minimum acceptable reading is 30 megohms. Transformers to be tested with 1000 volt megger. Minimum acceptable reading is 20 megohms.
 - 2. Contractor shall conduct such other tests and adjustments of equipment as required by Architect/Engineer or necessary to verify performance requirements. Submit data taken during such tests to Architect/Engineer. Contractor shall pay professional engineering fees involved in required testing of equipment.
 - 3. Electrical Contractor shall provide necessary electrical personnel and testing instruments as required to assist Architect/Engineer in testing of installation.

END OF SECTION

SECTION 26 05 53 IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Warning signs and labels.
- G. Field-painted identification of conduit.

1.02 RELATED REQUIREMENTS

- A. Section 09 91 23 - Interior Painting.
- B. Section 26 05 19 - CONDUCTORS: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- C. 26 0533.13 - Conduit.
- D. 26 0533.16 - Boxes.
- E. 26 2726 - Wiring Devices.
- F. 26 2816.16 - Enclosed Switches.

1.03 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. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

1.04 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - 2. 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. Industrial control panels.
 - c. Motor control centers.
 - d. Elevator control panels.
 - e. Industrial machinery.
- B. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.

2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

2.02 MANUFACTURERS

- A. Brady Corporation.
- B. Seton Identification Products.
- C. HellermannTyton.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.03 IDENTIFICATION

- A. Identification of Electrical Conduits and Raceways
 1. Electrical conduit which is accessible for maintenance operations (except conduits in finished spaces) shall be identified with approved stencils or semi-rigid plastic identification pipe markers, electrical markers, or approved equal.
 2. For stencils use black enamel (except white on black, red, blue or dark backgrounds). Where lines are painted, apply stencilling after the finish coat dried. Characters shall be one inch high and when dry shall be coated with clear lacquer or approved equivalent.
 3. Electrical markers to be used on diameters 3/4 inch through 5 inches.
 4. Electrical markers to be used on diameters 6 inches or larger (with wire bindings and seals).
 5. Markers (or stencils) shall be located adjacent to each junction box, pull box, controller, panelboard, transformer, relay, and the like.
 6. At Contractor's option, covers only of junction boxes shall be labeled or stenciled (in lieu of conduit) with approved permanent labels denoting voltage and circuit designation inside box (for single-phase legs, label voltage to ground; for two or more phase legs, label the phase-to-phase voltage; and combinations shall be suitably labeled).
- B. Equipment Identification
 1. Provide nameplates on equipment such as panelboards, distribution panels, motor starters, safety switches, control devices, and the like.
 2. Lettering shall include name of equipment, the specific unit number, and reference to on/off or other instructions that are applicable.
 3. Power panelboards, distribution panels, and motor control centers shall have a nameplate for each section of same and for each device contained therein, i.e., "Panel A," "Sump Pump," as is applicable.
 4. Nameplates shall be laminated phenolic with a white surface and black core. Use 1/16 inch thick material for plates up to 2 inches by 4 inches. For larger sizes use 1/8 inch thick material. Lettering of names should correspond to nomenclature specified for apparatus, corresponding with the Drawings, details, schedules, charts, wiring diagrams, and operating instructions as approved by the Architect/Engineer.
 5. Lettering shall be condensed Gothic. The space between lines shall be equal to the width of the letters. Use 1/4 inch minimum height letters which occupy 4 to the inch. Increase letter size to 3/4 inch on largest plates.
 6. In addition, feeder circuits which serve devices (panelboards, appliances) that are located remote from (more than 3 feet from) their main circuit protective device shall have approved identification installed where and as directed which indicates the origin of the power supply, feeder size, and location of main protective device, i.e., "Feeder No. 3; 4-500 MCM, 1-2 AWG Ground, 4" C.; Main Switchboard Circuit 13"; as is applicable.
 7. Appliances, motors, heaters, and the like which are served by a separately mounted disconnect switch, motor starter, or combination type motor starter shall be labeled accordingly for easy identification, i.e.:
 - a. Combination Starter: "HVAC-4" - "Supply Air Fan Motor"

- b. Motor at HVAC Unit: "HVAC-4" - "Supply Air Fan Motor"
 - c. Disconnect Switch: "HVAC-3" - "Primary Air Heater"
 - d. Heater at HV Unit: "HVAC-3" - "Primary Air Heater"
- 8. Nameplates to be .020 inch to .064 inch thick aluminum, not less than 3/4 inches by 2-1/2 inches or 1 inch by 3 inches, except 1-1/2 inches by 4 inches or 3 inches by 6 inches for large items. Plates shall have a colored enamel background, with etched or engraved natural aluminum lettering not less than 3/16 inch high, except 1/4 inch high for 1 inch by 3 inches and 1-1/2 inches by 4 inch plates and 1/2 inch high for 1-3/4 inches by 6 inches and larger plates (unless specifically described elsewhere in this Specification).
- 9. Background color shall be black, or as otherwise required. Plate shall have pressure sensitive permanent adhesive factory backing, as approved.
- 10. Note: Use 3/4 inch by 2-1/4 inch size for single gang face plates, 1-1/4 inches by 4 inches for two gang plates attached with black, round head, self threading screws, made of 1/16 inch minimum thick, laminated phenol resin sheet, with white background and black ink or lacquer filled lettering.
- 11. Attached directly to the apparatus in a manner approved by the Architect/Engineer.
- C. Outlet Box Covers (or finishing plates)
 - 1. Indicate circuit numbers in box on back (box) side of cover (plate) using heavy line laundry marker pen.
- D. Indexing
 - 1. Index each distribution center circuit and each panel circuit, clearly, neatly, and completely, including "Spares." Index shall be typewritten upon heavy card stock paper not subject to fading or mildew and shall be covered with a clear plastic window, and held securely in a suitable frame. Type date (month and year) and panel designation on each index.
 - 2. Each index shall be sequenced in accord with actual panel circuiting, i.e.:
 - a. Left side - top to bottom - 1, 3, 5, 7
 - b. Right side - top to bottom - 2, 4, 6, 8
 - c. All circuits shall be visible without removing panel index.
 - 3. Standard index cards printed 1, 2, 3, are not acceptable.
 - 4. Use actual Owner provided room numbers for circuit labeling in lieu of construction room numbers. Indexes provided with the Drawings are not suitable to use as panelboard indexes.
- E. Other Items
 - 1. Provide identification as required in other subsections of these Specifications and as denoted on the Drawings.

2.04 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Materials:
 - 2. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
 - 1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 - 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Nameplates: Engraved three-layer laminated plastic, black letters on white background.
- D. Locations:
 - 1. Each electrical distribution and control equipment enclosure.
 - 2. Communication cabinets.

- E. Letter Size:
 - 1. Use 1/8 inch letters for identifying individual equipment and loads.
 - 2. Use 1/4 inch letters for identifying grouped equipment and loads.

2.05 WIRE AND CABLE MARKERS

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.
- G. Description: Cloth type wire markers.
- H. Locations: Each conductor at panelboard gutters, pull boxes, outlet boxes, and junction boxes each load connection.
- I. Legend:
 - 1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
 - 2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on drawings.

2.06 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 wide, with minimum thickness of 4 mil.
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:
 - 1. Tape for Buried Power Lines: Black text on red background.
 - 2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

2.07 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
 - 1. Materials:
 - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
 - b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
 - 2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
 - 3. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
 - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 - 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 - 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

- D. Description: 4 inch wide plastic tape, detectable type colored red with suitable warning legend describing buried electrical lines.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.
- B. Degrease and clean surfaces to receive nameplates and labels.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 - 1. Surface-Mounted Equipment: Enclosure front.
 - 2. Flush-Mounted Equipment: Inside of equipment door.
 - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 - 4. Elevated Equipment: Legible from the floor or working platform.
 - 5. Interior Components: Legible from the point of access.
 - 6. Conductors and Cables: Legible from the point of access.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
- G. Secure rigid signs using stainless steel screws.

END OF SECTION

SECTION 26 05 55 CONNECTORS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as though bound herein.

1.02 SUMMARY

- A. Provide required materials for a complete system.
- B. Upon request, points of junction, splices, taps, connections, pull boxes, and outlets shall be opened for inspection by Architect/Engineer or other approved authority.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Connectors shall be similar and equal to those manufactured by O.Z. Electrical Manufacturing Company, Burndy Engineering Company, Thomas & Betts Company.
- B. Splices, taps, and other connections involving conductors not larger than No. 8 AWG max. shall be made with insulated connectors like 3M Co. "Scotchloks," Ideal Co. "Wing-Nut," or T & B Co. "Piggy" connectors. Connectors shall be wrapped with 8.5 mil heavy duty, premium grade all-weather vinyl electrical insulating tape.
- C. Splices, taps, and other connections involving conductors larger than No. 8 AWG shall be made using approved compression type connectors, insulated with at least four 1/2 lap layers of 8.5 mil heavy duty, premium grade all-weather vinyl electrical insulating tape and covered overall with at least two 1/2 lap wraps of friction tape.
- D. Connections or joints in wet or damp areas shall be waterproofed in an approved manner.
- E. Connectors shall be sized to carry 100 percent of the current capacity of the conductors connected. Conductors shall not be trimmed to fit a connection, the connection device shall be changed to accommodate the conductor.
- F. Compression lugs shall be by T&B, O.Z. Electrical Manufacturing, or Burndy Engineering Company.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Splices and taps shall be made using approved mechanical connectors of the type best suited.
- B. Under no circumstances will a soldered splice, tap, or connection be acceptable.

END OF SECTION

**SECTION 26 05 76
HAIR DRYERS/HAND DRYERS**

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, and the Sections 26 0101 and 26 05 50, are included as a part of this Section though bound herein.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Approved Manufacturers
 - 1. Bradley
- B. Hand/hair dryers shall be high velocity type, steel housing, satin stainless steel finish, automatic, surface mounted.
- C. Hand/hair dryers shall be 120V, 20A, 1150W.
- D. Bradley Model number 2902-287400.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Mount the unit where denoted on the Drawings. Mounting height shall be as directed by the Drawings.

END OF SECTION

**SECTION 26 05 83
EQUIPMENT WIRING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 19 - CONDUCTORS.
- B. Section 26 05 33.13 - CONDUIT.
- C. Section 26 0526 - Grounding and Bonding
- D. Section 26 05 33.16 - BOXES.
- E. Section 26 27 26 - WIRING DEVICES.
- F. Section 26 28 16.16 - ENCLOSED SWITCHES.

1.03 REFERENCE STANDARDS

- A. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.05 COORDINATION

- A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- B. Determine connection locations and requirements.
- C. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- D. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
 - 1. Colors: Comply with NEMA WD 1.
 - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
 - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
- B. Disconnect Switches: As specified in Section 26 28 16.16 and in individual equipment sections.
- C. Wiring Devices: As specified in Section 26 27 26.
- D. Flexible Conduit: As specified in Section 26 05 33.13.
- E. Wire and Cable: As specified in Section 26 05 19.
- F. Boxes: As specified in Section 26 05 33.16.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

SECTION 26 24 16 PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Load centers.
- B. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding
- B. Section 26 05 29 - HANGERS AND SUPPORTS.
- C. Section 26 05 53 - IDENTIFICATION: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- 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 AB 1 - Molded Case Circuit Breakers and Molded Case Switches; National Electrical Manufacturers Association; 1993.
- F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2008 (Reaffirmed 2020).
- G. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum) 2013.
- H. NEMA PB 1 - Panelboards 2011.
- I. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less 2013.
- J. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- L. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- M. UL 67 - Panelboards Current Edition, Including All Revisions.
- N. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3300 - Submittal Procedures
- 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.
- 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 locations of panelboards and actual installed circuiting arrangements.

- E. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Square D
- B. Substitutions: See Section 01 60 00 - Product Requirements.

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. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating: As indicated on drawings.
- D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 - 1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. 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.
 - 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 - 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

2.03 LOAD CENTERS

- A. Description: Circuit breaker type load centers listed and labeled as complying with UL 67; ratings, configurations, and features as indicated on the drawings.
- B. Bussing:
 - 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 - 2. Bus Material: Aluminum or copper.
- C. Circuit Breakers: Thermal magnetic plug-in type.

- D. Enclosures:
 - 1. Provide surface-mounted enclosures unless otherwise indicated.
 - 2. Provide circuit directory label on inside of door or individual circuit labels adjacent to circuit breakers.

2.04 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.
 - 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: Aluminum, suitable for terminating aluminum or copper conductors.
 - 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.
 - 5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

PART 3 EXECUTION

3.01 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. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Install panelboards plumb.
- G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- H. Provide grounding and bonding in accordance with Section 26 05 26.
- I. Install all field-installed branch devices, components, and accessories.
- J. Install panelboards in accordance with NEMA PB 1.1 and NECA 1.
- K. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.
- L. Provide filler plates to cover unused spaces in panelboards.
- M. Provide identification nameplate for each panelboard in accordance with Section 26 05 53.
- N. Provide spare conduits out of each recessed panelboard to an accessible location above ceiling. Identify each as SPARE.
 - 1. Minimum spare conduits: 4 empty 1 inch.

3.02 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, for additional requirements.

- B. Test GFCI circuit breakers to verify proper operation.
- C. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.03 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 10 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.04 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 26 27 26 WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Receptacles.
- B. Wall plates.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 33.16 - BOXES.
- B. Section 26 0526 - Grounding and Bonding

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2014h, with Amendments (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- D. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- E. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.
- H. UL 514D - Cover Plates for Flush-Mounted Wiring Devices Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cooper
- B. Arrow Hart
- C. Pass & Seymour
- D. Hubbell
- E. Leviton

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 ampere rating 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 of sinks.

2.03 ALL WIRING DEVICES

- A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.04 RECEPTACLES

- A. 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.
- B. Receptacles: Heavy duty, complying with NEMA WD 6 and WD 1.
 - 1. Configuration: NEMA WD 6, type as specified and indicated.
 - 2. Prewired pigtail connectors that accommodate Fed Spec receptacles are approved. Must be crimped and welded terminal application connector.
- C. Convenience Receptacles: Type 5 - 20 equal to Hubbell 5362, Cooper BR20, or Pass & Seymour CR20W.
 - 1. Prewired pigtail receptacles: Type 5 - 20 equal to Pass & Seymour PT5362, Hubbell SNAP5362, or Cooper ArrowLink.
- D. GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

2.05 WALL PLATES

- A. 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 slotted heads finished to match wall plate finish.
- B. Weatherproof covers to be metal hinged covers that allows cord to be plugged in with cover closed.

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 26 05 33.16 as required for installation of wiring devices provided under this section.
- 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 long. Do not connect more than one conductor to wiring device terminals.
- F. Modular wiring devices are seen as an acceptable alternative at the discretion of the contractor. Receptacles must meet UL498 and Federal Specification WC-596 requirements. Switches must meet UL20 and Federal Specification WC-896 requirements. Prewired terminal application pigtail connectors must be crimped and welded.
- G. 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.
- H. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- I. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- J. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
- K. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- L. Do not share neutral conductor on branch circuits utilizing wall dimmers.
- M. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- N. 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.
- O. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- P. Connect wiring device grounding terminal to outlet box with bonding jumper.
- Q. Install standard plates on switch, receptacle, and blank outlets in finished areas.
- R. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- S. Install protective rings on active flush cover service fittings.

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 to obtain mounting heights specified.
- B. Mounting heights refer to bottom of box.
- C. Install convenience receptacle 16 inches above finished floor, UNO.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, for additional requirements.
- B. Inspect each wiring device for damage and defects.

- C. Verify that each receptacle device is energized.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.06 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.07 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

**SECTION 26 28 16.13
ENCLOSED CIRCUIT BREAKERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed circuit breakers.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 29 - HANGERS AND SUPPORTS.
- B. Section 26 05 53 - IDENTIFICATION: Identification products and requirements.
- C. Section 26 05 26 - Grounding and Bonding

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- E. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; 1993.
- F. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches; National Electrical Manufacturers Association; 1993.
- 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 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for circuit breakers, enclosures, and other installed components and accessories.
- 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, installation, and starting of product.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Perform Work in accordance with NECA Standard of Installation.
- C. Maintain one copy of each document on site.
- D. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Square D
- B. Siemens
- C. Cutler Hammer
- D. General Electric
- E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ENCLOSED CIRCUIT BREAKERS

- A. Description: Units consisting of molded case circuit breakers individually mounted in enclosures.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between 23 degrees F and 104 degrees F.
- D. Short Circuit Current Rating:
 - 1. Provide enclosed circuit breakers with listed short circuit current rating not less than the available fault current at the installed location indicated on the drawings.
- E. Conductor Terminations: Suitable for use with the conductors to be installed.
- F. Provide solidly bonded equipment ground bus in each enclosed circuit breaker, with a suitable lug for terminating each equipment grounding conductor.
- G. 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. Outdoor Locations: Type 3R.
- H. Provide externally operable handle with means for locking in the OFF position.

2.03 MOLDED CASE CIRCUIT BREAKERS

- A. 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.
- B. Interrupting Capacity:
 - 1. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - a. 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - 2. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
- C. Conductor Terminations:
 - 1. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
- D. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
- E. Circuit Breakers: NEMA AB 1.
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between 23 degrees F and 104 degrees F.

2.04 ACCESSORIES

- A. Enclosures:
 - 1. Fabricate enclosures from steel.

- 2. Finish: Manufacturer's standard enamel finish, gray color.
- B. Provide accessories as scheduled.
- C. Handle Lock: Include provisions for sealing.
- D. Provide mechanical trip device.
- E. Provide insulated grounding lug in each enclosure.
- F. Provide products suitable for use as service entrance equipment where so applied.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install enclosed circuit breakers plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed circuit breakers such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 05 26.
- H. Height: 5 feet to operating handle for individual enclosed circuit breakers.
- I. Provide identification nameplates for each enclosed circuit breaker in accordance with Section 26 05 53.

3.02 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, for additional requirements.
- B. Inspect and test in accordance with manufacturer's instructions and NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for circuit breakers used for service entrance and for circuit breakers larger than [] amperes. Tests listed as optional are not required.
- D. Correct deficiencies and replace damaged or defective enclosed circuit breakers.
- E. Inspect and test each circuit breaker.
- F. Inspect each circuit breaker visually.
- G. Perform several mechanical ON-OFF operations on each circuit breaker.
- H. Verify circuit continuity on each pole in closed position.
- I. Determine that circuit breaker will trip on overcurrent condition, with tripping time to NEMA AB 1 requirements.

3.03 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

END OF SECTION

**SECTION 26 51 00
INTERIOR LIGHTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding
- B. Section 26 05 29 - HANGERS AND SUPPORTS.
- C. Section 26 05 33.16 - BOXES.

1.03 REFERENCE STANDARDS

- A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.
- B. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast; 2004.
- C. ANSI C82.4 - American National Standard for Lamp Ballasts - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps 2017.
- D. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems 2006.
- E. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems 1999 (Reaffirmed 2006).
- F. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R2008).
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 1598 - Luminaires Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Submittal Procedures
- B. Shop Drawings: Indicate dimensions and components for each luminaire.
- C. 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.
- D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Conform to requirements of NFPA 70 and NFPA 101.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS - LUMINAIRES

- A. As indicated on the Drawings.
- B. Substitutions: See Section 01 60 00 - Product Requirements except where individual luminaire types are designated with substitutions not permitted.

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.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 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 26 05 29.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Support luminaires larger than 2 x 4 foot size independent of ceiling framing.
- G. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- H. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- I. Grid Ceilings: Fasten luminaires to ceiling grid members using suitable clips.
- J. Install recessed luminaires to permit removal from below.
- K. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- L. Install wall mounted luminaires at height as indicated on Drawings.
- M. Install accessories furnished with each luminaire.
- N. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- O. Bond products and metal accessories to branch circuit equipment grounding conductor.
- P. Install specified lamps in each luminaire.
- Q. Install lamps in each luminaire.

3.02 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, 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 Architect.

3.03 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

3.04 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.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosures.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

3.05 PROTECTION

- A. Relamp luminaires that have failed lamps at Substantial Completion.

3.06 SCHEDULE - SEE DRAWINGS

END OF SECTION

**SECTION 26 56 00
EXTERIOR LIGHTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior luminaires.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding
- B. Section 26 05 29 - HANGERS AND SUPPORTS.
- C. Section 26 05 33.16 - BOXES.

1.03 REFERENCE STANDARDS

- A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.
- B. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast; 2004.
- C. ANSI C82.4 - American National Standard for Lamp Ballasts - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps 2017.
- D. IES RP-8 - Recommended Practice: Lighting Roadway and Parking Facilities 2021.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems 2000 (Reaffirmed 2006).
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 1598 - Luminaires Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3300 - Submittal Procedures
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide 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.
- D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. As indicated on the Drawings.

2.02 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 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.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 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 26 05 29.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Install accessories furnished with each luminaire.
- G. Bond products and metal accessories to branch circuit equipment grounding conductor.
- H. Install lamps in each luminaire.

3.02 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.
- D. Operate each luminaire after installation and connection to verify proper operation.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.03 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.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosure.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

3.04 SCHEDULE - SEE DRAWINGS

END OF SECTION

**SECTION 31 10 00
SITE CLEARING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Clearing of existing vegetation.
- B. Protection of vegetation to remain and repair work for construction damage. Work to be completed in accordance with approved nursery standards.
- C. Trimming and shaping of existing vegetation to remain.
- D. Removal of existing debris.

1.02 RELATED REQUIREMENTS

- A. Section 01 11 00 - Summary of Work: Limitations on Contractor's use of site and premises.
- B. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- D. Section 31 22 00 - Grading: Topsoil removal.
- E. Section 31 23 23 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.
- F. Section 32 93 00 - Plants: Relocation of existing trees, shrubs, and other plants.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fill Material: As specified in Section 31 23 23 - Fill and Backfill

PART 3 EXECUTION

3.01 SITE CLEARING

- A. Comply with other requirements specified in Section 01 70 00.
- 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. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, and paving.
- B. In areas where vegetation must be removed but no construction will occur, remove vegetation with minimum disturbance of the subsoil.
- C. 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.
 - a. Green wood is not to be used for mulch.

2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
 3. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.
 4. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.
- D. Restoration:
1. If vegetation outside removal limits or within specified protective fences is damaged, or destroyed, due to subsequent construction operations, replace at no cost to City of Greenville. This includes root damage due to poor protection fence or upkeep.
 - a. Trees and vegetation will be considered dead when main leader has died back or when 25 percent or more of crown has died .
 - b. Trees will be considered damaged and not able to reasonably survive when repeated neglect of protection is observed.
 2. If a tree is deemed damaged or dead by the owner's representative, a \$500 per caliper inch of tree penalty will be assessed.

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 31 22 00 GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal of topsoil.
- B. Rough grading the site for building pads and site improvements.
- C. Topsoil testing, amendment and Finish grading for planting.

1.02 RELATED REQUIREMENTS

- A. Section 31 10 00 - Site Clearing.
- B. Section 31 23 16 - Excavation.
- C. Section 31 23 23 - Fill: Filling and compaction.
- D. Section 32 93 00 - Plants: Topsoil in beds and pits.

1.03 SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.04 PROJECT CONDITIONS

- A. Protect above- and below-grade utilities that remain.
- B. Protect plants, lawns, and other features to remain as a portion of final landscaping.
- C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from grading equipment and vehicular traffic.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Topsoil: Topsoil excavated on-site.
 - 1. Free of roots, gravel overages, rocks larger than 3/4 inch, subsoil, debris, large weeds and foreign matter.
 - 2. Within 50 feet of the building and in compacted areas, topsoil to be amended to be capable of sustaining vigorous plant growth with acceptable NPK levels, micronutrient levels, and have a minimum pH value of 5.4 and maximum of 7.0.
 - 3. Within 50 feet of the building and in compacted areas, topsoil to contain 4-8% organic matter
 - 4. Soil shall have the following USDA particle size analysis. Sand, silt and clay shall be determined by ASTM D422
 - a. Gravel: Plus 2mm. Less than 10%
 - b. Sand: .05mm to .2mm. 15-40%
 - c. Silt: .002 to .05mm. 25-65%
 - d. Clay: minus .002mm. 20-35%
- B. Soil Amendment Materials:
 - 1. Amend topsoil based on recommendations of topsoil test. Amendments may include, but are not limited to:
 - a. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight, pH range of 4 to 5; moisture content of 30 percent.
 - b. Composted Organic Material: Mature, stable humus-like material derived from aerobic decomposition. The compost shall be dark brown to black in color and capable of supporting plant growth.
 - 1) Carbon to Nitrogen ratio not to exceed 35 to 1.

- c. Bone Meal: Raw, finely ground, commercial grade, minimum of 3 percent nitrogen and 20 percent phosphorous.
- d. Lime: Ground limestone, dolomite type, minimum 95 percent carbonates.
- e. Fertilizer: as indicated in analysis.

C. Other Fill Materials: See Section 31 23 23.

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.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Protect from damage above- and below-grade utilities to remain.
- D. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.
- E. 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.
- F. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

3.03 ROUGH GRADING

- A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
- B. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- C. Do not remove wet subsoil , unless it is subsequently processed to obtain optimum moisture content.
- D. When excavating through roots, perform work by hand and cut roots with sharp axe.
- E. Grade areas adjacent to building to drain away from structures and to prevent ponding.
- F. See Section 31 23 23 for filling procedures.
- G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.
- H. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.04 SOIL REMOVAL AND STOCKPILING

- A. Stockpile topsoil to be re-used on site; remove remainder from site.
- B. Stockpile excavated subsoil on site.
- C. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.
- D. Stockpiles:
 - 1. Stockpile without intermixing soil types
 - 2. Use areas designated on the site
 - a. Stockpile soil material away from edges of excavations
 - b. Do not place stockpiles within the drip line of trees to remain.
 - 3. Pile depth not to exceed 8 feet
 - 4. Place, grade and shape stockpiles to drain surface water.
 - 5. Protect from erosion (wind and water). Stabilize with temporary vegetation or tarps.

3.05 GENERAL SURFACE GRADING

- A. Uniformly grade areas within project limits including adjacent transition areas.
 - 1. Smooth finish surface within specified tolerances, grade in uniform levels or slopes between points where elevations are shown and between points and existing grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

3.06 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 in size. Remove soil contaminated with petroleum products.
- C. Within 50 feet and in areas where vehicles or equipment have compacted soil, scarify surface to a minimum depth of 6 inches.
- D. Pulverize and place topsoil where required to level finish grade.
- E. Pulverize and place topsoil to the following compacted thicknesses:
 - 1. Areas to be Seeded with Grass: 6 inches.
 - 2. Areas to be Sodded: 4 inches.
 - 3. Shrub Beds: 18 inches.
- F. Place topsoil during dry weather.
- G. Remove roots, weeds, rocks, and foreign material while spreading.
- H. Near plants and site improvements spread topsoil manually to prevent damage.
- I. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
- J. Lightly compact placed topsoil.
- K. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

3.07 TOLERANCES

- A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.
- B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch).

3.08 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 the contractor will hire an arborist to trim broken branches and repair bark wounds; if root damage has occurred, obtain instructions from Architect as to remedy.
- C. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.09 FIELD QUALITY CONTROL

- A. See Section 31 23 23 for compaction density testing.

3.10 CLEANING

- A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.
- B. Leave site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 31 23 16 EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavating for footings, slabs-on-grade, paving, and dewatering.
- B. Trenching for utilities outside the building to utility main connections.
- C. Dewatering

1.02 RELATED REQUIREMENTS

- A. Section 01 4000 - Quality Requirements
- B. Section 31 10 00 - Site Clearing: Vegetation and existing debris removal.
- C. Section 31 22 00 - Grading: Grading.
- D. Section 31 23 23 - Fill: Fill materials, backfilling, and compacting.

1.03 DEFINITIONS

- A. Excavation: Removal of material encountered required for building volume below grade, footings, slab-on-grade, paving, utility trenches, etc.
- B. Additional Excavation: Excavation below required excavation as directed by the Architect. Additional excavation and replacement material will be paid for according to the Contract provisions for changes in the work.
- C. Unauthorized Excavation: Excavation below required excavation or beyond required excavation without direction of the Architect. Unauthorized excavation and remedial work directed by the Architect shall be without additional compensation.

1.04 QUALITY ASSURANCE

- A. Code and Standards: Perform work complying with requirements of authorities having jurisdiction
- B. Testing and Inspection: A qualified independent geotechnical engineering testing agency shall classify proposed on-site borrow soils to verify that soils comply with specified requirements and to perform required field and laboratory testing.

1.05 PROJECT CONDITIONS

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.
- B. Protect plants, lawns, and other features to remain.
- C. Protect bench marks, survey control points, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that survey bench mark and intended elevations for the work are as indicated.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 31 10 00 for clearing, grubbing, and removal of existing debris.
- C. See Section 31 22 00 for topsoil removal.
- D. Protect utilities that remain and protect from damage.
- E. Notify utility company to remove and relocate utilities.

- F. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Architect.

3.03 DEWATERING

- A. Prevent surface water and ground water from entering excavations and from flooding project site and surrounding area.
- B. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings and soil changes detrimental to stability of subgrades and foundations.
 - 1. Provide and maintain pumps, sumps, suction and discharge lines and other dewatering systems necessary to convey water away from excavations.

3.04 EXCAVATING

- A. General
 - 1. Explosives: Do not use explosives
 - 2. Underpin adjacent structures that could be damaged by excavating work.
 - 3. Excavate to accommodate new structures and construction operations.
 - 4. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
 - 5. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.
 - 6. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
 - 7. Do not interfere with 45 degree bearing splay of foundations.
 - 8. Cut utility trenches wide enough to allow inspection of installed utilities.
 - 9. Hand trim excavations. Remove loose matter.
 - 10. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 23 23.
 - 11. Provide temporary means and methods, as required, to remove all water from excavations until directed by Architect. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.
 - 12. Determine the prevailing groundwater level prior to excavation. If the proposed excavation extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect. If the proposed excavation extends more than 1 foot into the excavation, control groundwater intrusion with a comprehensive dewatering procedures, or as directed by the Geotechnical Engineer.
 - 13. Remove excavated material that is unsuitable for re-use from site.
 - 14. Stockpile excavated material to be re-used in area designated on site 31 22 00.
 - 15. Remove excess excavated material from site.
- B. Excavation for structures:
 - 1. Excavate to indicated elevations and dimensions within a tolerance of plus or minus one (1) inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction.
 - a. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave a solid base to receive other work.
- C. Excavation for walks and pavements:
 - 1. Excavate surfaces under walks and pavements to indicated cross sections, elevations and grades.
- D. Excavation for trenches:
 - 1. Cut utility trenches wide enough to allow inspection of installed utilities.

2. Excavate trenches to indicated gradients, lines, depths and elevations. Beyond building perimeter keep bottoms of trenches sufficiently below grade to avoid freezing.
3. Excavate trenches to uniform width to provide working clearance on each side of pipe or conduit. Provide 12 inches clearance on each side
4. If bedding course is not called for, excavated and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints and barrels of pipes and for joints, fittings and bodies of conduits. Remove stones and sharp objects to avoid point loading.
 - a. For pipe and conduits less than 6 inches in nominal diameter and flat bottom multi-duct conduit lines excavate to indicated depths and support pipe and conduit on an undisturbed subgrade.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, for general requirements for field inspection and testing.
- B. Provide a test to verify required design bearing capacities at each strata of soil on which footings will be placed.
 1. Provide a test for every 200 lineal feet of footing.
 2. Verification and approval each footing at the strata of soil may be based on visual inspection and comparison between tests locations.
 3. Provide a minimum of three (3) tests for each building
- C. Provide a test to verify required design bearing capacities of soil on which slabs on grade will be placed.
 1. Provide a minimum of one test for each 5,000 square feet of building area.
 2. Provide a minimum of three (3) test for each building
- D. Provide a test to verify required design bearing capacities at each strata of soil on which footings will be placed.
- E. Provide a minimum of three (3) test for each building
- F. Provide for visual inspection of load-bearing excavated surfaces by Architect before placement of foundations.

3.06 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.
- F. Repair and re-establish grades to specified tolerances where completed surfaces become eroded, rutted, settled or lose compaction due to subsequent construction operations or weather conditions.

END OF SECTION

SECTION 31 23 23 FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Filling, backfilling, and compacting for building volume below grade, footings, slabs-on-grade, paving, and site structures.
- B. Backfilling and compacting for utilities outside the building to utility main connections.
- C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

- A. Section 31 22 00 - Grading: Removal and handling of soil to be re-used.
- B. Section 31 23 16 - Excavation: Removal and handling of soil to be re-used.

1.03 DEFINITIONS

- A. Finish Grade Elevations: Indicated on drawings.
- B. Subgrade Elevations: The uppermost surface of an excavation, the top of surface of a fill or backfill, immediately below subbase, drainage fill, or topsoil materials.
- C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.
- D. Bedding Course: Layer placed over excavated subgrade in a trench before laying pipe.

1.04 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 2021, with Errata (2022).
- B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates 2019.

1.05 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 designated.
 - 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 Fill: Subsoil excavated on-site and imported if required.
 - 1. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
 - 2. Excavated material subject to the approval by representative of the soils testing agency.
- B. Structural Fill: Subsoil excavated on-site imported if required
 - 1. Fill to not contain more than 3 percent by weight of organic matter, waste construction debris, or other deleterious materials.
 - 2. Non-expansive materials must be used.
 - 3. Standard Proctor Maximum Density Greater than 100 pounds per cubic foot and Atterburg Liquid Limit less than 40, and a plasticity index of less than 20.
 - 4. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
 - 5. Excavated material subject to the approval by representative of the soils testing agency.
- C. Engineered Fill: Subsoil excavated on-site and imported borrow if required.
 - 1. Silty-clayey soils or bankrun sand and gravel

2. Fill to not contain more than 3 percent by weight of organic matter, waste construction debris, or other deleterious materials.
 3. Non-expansive materials must be used.
 4. Standard Proctor Maximum Density Greater than 100 pounds per cubic foot and Atterburg Liquid Limit less than 40, and a plasticity index of less than 20.
 5. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
 6. Excavated material subject to the approval by representative of the soils testing agency.
- D. Concrete for Fill: Lean concrete.
1. Ready-mixed concrete
 2. Compressive strength 1500 psi at 28 days
- E. Flowable Fill:
1. Mix design shall have an unconfined compressive strength according to ASTM D4832.
 2. Mix design shall generally conform to the following:
 - a. Type 1 for pipe trench backfill
 - 1) Cement: 50 lbs/cu yd
 - 2) Fly Ash: 250 lbs/cu yd
 - 3) Fine Aggregate: 2910 lbs/cu yd
 - 4) Water: 500 lbs/cu yd
 - 5) Entrained Air: 0%
 - b. Type 2 for backfill under structures
 - 1) Cement: 50 - 100 lbs/cu yd
 - 2) Fly Ash: 0 lbs/cu yd
 - 3) Fine Aggregate: 2420 lbs/cu yd
 - 4) Water: 210-300 lbs/cu yd
 - 5) Entrained Air: 5% plus or minus 1 1/2 %
 3. Mixes shall conform to the requirements of ACI 229 for Controlled Low Strength Material.
 4. Mixes shall be flowable.
 5. Flowable fill shall be ready-mixed concrete.
- F. Granular Fill - Gravel : Angular crushed washed stone; free of shale, clay, friable material and debris.
1. Graded in accordance with ASTM C136/C136M, within the following limits:
 - a. 2 inch sieve: 100 percent passing.
 - b. No. 200: 5 to 10 percent passing.
- G. Drainage Fill:
1. # 56 or # 57 in accordance with the Ohio Department of Transportation Construction and Material Specifications
 2. Drainage fill shall be clean and washed gravel
- H. Sand: Conforming in accordance with Ohio Department of Transportation Construction and Material Specifications
- I. Topsoil: See Section 31 22 00.

2.02 SOURCE QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, 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.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 31 22 00 for additional requirements.
- C. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.
- D. Verify structural ability of unsupported walls to support imposed loads by the fill.
- E. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

- A. After topsoil has been stripped proof roll areas to be occupied by the new building, paved surfaces and site improvements using a medium weight roller. A representative of the soils testing agency shall be present during proof rolling.
- 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 DEWATERING

- A. Prevent surface water and ground water from entering excavations and from flooding project site and surrounding area.
- B. Protect subgrade from softening, washout, undermining and damage.
 - 1. Provide and maintain pumps, sumps, suction and discharge lines and other dewatering systems necessary to convey water away from excavations.

3.04 FILLING

- A. Fill to contours and elevations indicated using unfrozen materials.
- B. Fill up to subgrade elevations unless otherwise indicated.
- C. Fill placement shall extend beyond the limits of the proposed building and paved areas a minimum horizontal distance equal to the height of fill or 5 feet whichever is greater.
- D. Employ a placement method that does not disturb or damage other work.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
 - 1. Moisture reduction options:
 - a. Disking and drying soil.
 - b. Addition of lime or by-product lime modification. Modification procedure to follow the guidelines of ODOT Item 205 using a lime by-product or similar material capable of reducing the moisture content of moist soils. Testing agency to evaluate compatibility of materials and modification procedures.
- F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 8 inches compacted depth.
- G. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.
- H. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- I. Correct areas that are over-excavated.
 - 1. Load-bearing foundation surfaces: Use structural fill, flush to required elevation, compacted to 100 percent of maximum dry density.
 - 2. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.
- J. Compaction Density Unless Otherwise Specified or Indicated:

1. Under paving, slabs-on-grade, and similar construction: 97 percent of maximum dry density.
 2. At load bearing foundations: 100 percent of maximum dry density.
 3. At other locations: 90 percent of maximum dry density.
- K. Reshape and re-compact fills subjected to vehicular traffic.
- L. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.05 FILL AT SPECIFIC LOCATIONS

- A. Use general fill unless otherwise specified or indicated.
- B. Under load bearing footings and foundations
1. Use Engineered Fill or Structural Fill
 2. Fill up to subgrade elevations.
 3. Maximum depth per lift: 8 inches, compacted.
 4. Compact to minimum 100 percent of maximum dry density.
- C. Under Interior Slabs-On-Grade:
1. Use Engineered Fill or Structural up to 4 inches below concrete slab
 2. Maximum depth per lift: 8 inches compacted.
 3. Use Drainage Fill.
 4. Depth: 4 inches deep.
 5. Compact to 97 percent of maximum dry density.
 6. See Section 03 3000 for placement of Vapor Barrier
- D. At Foundation Walls:
1. Use general fill.
 2. Fill up to subgrade elevation.
 3. Maximum depth per lift: 8 inches compacted.
 4. Compact each lift to 95 percent of maximum dry density.
 5. Do not backfill against unsupported foundation walls.
 6. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- E. Over Buried Utility Piping, Conduits, and Duct Bank in Trenches:
1. Bedding: Use sand or Drainage Fill
 2. Haunching: Use sand fill. Haunching fill up to spring line of pipe
 3. Initial Backfill: Use granular fill. Initial backfill up to 12 inches above the pipe
 4. Cover with :
 - a. Exterior lawn areas: General Fill
 - b. Within building area: Granular Fill
 - c. Within building area where trench is within 18 inches of column or footing and below bottom of footing:
 - 1) Wrap pipe with one inch of fiberglass blanket and Concrete Fill or Flowable to bottom of footing
 - 2) Above Concrete Fill: Granular Fill or Flowable Fill
 - d. Under paving and walks: Granular Fill or Flowable Fill
 5. Fill up to subgrade elevation.
 6. Compact in maximum 6 inch lifts to 95 percent of maximum dry density.
- F. Under Portland Cement Concrete Paving:
1. Use Engineered Fill or Structural Fill up to bottom of Drainage fill.
 - a. Maximum depth per lift: 6 inches of loose material.

- b. Compact each lift to 100 percent of Standard proctor maximum dry density as determined by ASTM Designation D698.
- 2. Place 4 inches of Drainage Fill.
 - a. Compact to 100 percent of Standard proctor maximum dry density as determined by ASTM Designation D698.

3.06 TOLERANCES

- A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.
- B. Top Surface of Filling Under Paved Areas: Plus or minus 1 inch from required elevations.

3.07 PROTECTION

- A. Protected newly filled areas from traffic, freezing and erosion. Keep free of trash and debris.
- B. Repair and re-establish filled areas to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or loses compaction due to subsequent construction operations or weather conditions.
 - 1. Remove and replace material to depth directed by the Architect, reshape and recompact at optimum moisture content to the required density.
- C. Settling: Where settling occurs during the project warranty period, remove finish surface, backfill with additional approved material compact and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work and eliminate the evidence of restoration to the greatest extent possible.

3.08 CLEANING

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

**SECTION 32 11 23
AGGREGATE BASE AND SURFACING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aggregate base course.

1.02 RELATED REQUIREMENTS

- A. Section 31 22 00 - Grading: Preparation of site for base course.
- B. Section 31 23 23 - Fill: Compacted fill under base course.
- C. Section 32 13 13 - Concrete Paving: Finish concrete surface course.

1.03 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 2021, with Errata (2022).
- B. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) 2017, with Editorial Revision (2020).
- C. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

1.04 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.
- C. Verify that survey bench marks and intended elevations for the Work are as indicated.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aggregate: Coarse aggregate, conforming to Ohio Department of Transportation (ODOT) Construction and Material Specifications, Item 304
- B. AASHTO #57 Stone: Open-graded, self-compacting (angular) aggregate blend of size 5, 6 & 7 stone, graded in accordance with the following limits:
 - 1. 1 1/2" screen: 100% passing
 - 2. 1" screen: 95-100% passing
 - 3. 1/2" screen: 25-80% passing
 - 4. screen #4: 0-10% passing
 - 5. screen #8: 0-5% passing
- C. Use of Reclaimed Base:
 - 1. Contractor may use a blend of new material in combination with reclaimed aggregate material.
 - 2. Material subject to the approval by representative of the testing agency.
- D. Recyclable Aggregate: Concrete and masonry products from on site demolition:
 - 1. Remove reinforcing and separate to salvaged metals.
 - 2. Remove brick and clay masonry.
 - 3. Crush concrete and masonry waste to less than 1 1/2 inch in each direction.
 - 4. Crush concrete and masonry waste with at least four (4) parts of specified aggregate for each part of concrete waste.
 - 5. Material subject to the approval by representative of the testing agency.

- E. Concrete Waste Disposal as Aggregate Material: Dispose of clean hardened concrete waste by crushing and mixing with aggregate as aggregate is placed.
 - 1. Remove reinforcing and separate to salvaged metals
 - 2. Crush concrete waste to less than 1 1/2 inch in each direction.
 - 3. Crush concrete waste with at least four (4) parts of specified aggregate for each part of concrete waste.
 - 4. Material subject to the approval by representative of the testing agency.
- F. Masonry Disposal as Aggregate Material: Dispose of clean concrete masonry waste by crushing and mixing with aggregate as aggregate is placed. Comply with the requirements of the testing agency.
 - 1. Remove reinforcing and separate to salvaged metals.
 - 2. Remove brick and clay masonry.
 - 3. Crush concrete masonry waste to less than 1 1/2 inch in each direction.
 - 4. Crush concrete masonry waste with at least four (4) parts of specified aggregate for each part of concrete waste.
 - 5. Material subject to the approval by representative of the testing agency.

2.02 SOURCE QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, 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. Under Portland Cement Concrete Paving:
 - 1. Place course aggregate to a compacted thickness as shown.
 - a. 4 inches minimum thickness if not called out otherwise
 - 2. Compact to 95 percent of maximum dry density.
- B. Place aggregate in maximum 6 inch layers and roller compact to specified density.
- 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 measured with 10 foot straight edge.
- B. Scheduled Compacted Thickness: Within 1/4 inch.

- C. Variation From Design Elevation: Within 1/2 inch.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, for general requirements for field inspection and testing.
- B. Proof roll compacted aggregate at surfaces that will be under slabs-on-grade and 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 32 13 13
CONCRETE PAVING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete paving, sidewalks.
- B. Concrete structure collars (manhole, catch basins, drains)

1.02 RELATED REQUIREMENTS

- A. Section 03 10 00 - DO NOT USE - Concrete Forming and Accessories.
- B. Section 31 2200 - Grading.
- C. Section 31 2323 - Fill.

1.03 REFERENCE STANDARDS

- A. ACI 211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide 2022.
- B. ACI 301 - Specifications for Concrete Construction 2020.
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).
- D. ACI 305R - Guide to Hot Weather Concreting 2020.
- E. ACI 306R - Guide to Cold Weather Concreting 2016.
- F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.
- H. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022a.
- I. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).
- J. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).
- K. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.
- L. ASTM D1752 - Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on joint filler, admixtures, and curing compound.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Obtain cementitious materials from same source throughout.
- C. Follow recommendations of ACI 305R when concreting during hot weather.
- D. Follow recommendations of ACI 306R when concreting during cold weather.
- E. Installer Qualifications: Installer with minimum three years experience in similar projects.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

- A. Comply with applicable requirements of ACI 301.
- B. Pedestrian Concrete: 4,500 psi 28 day concrete, 4 inches thick. light broom finish.

2.02 FORM MATERIALS

- A. Form Materials: As specified in Section 03 10 00, comply with ACI 301.
- B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
 - 1. Thickness: 1/4 inch.

2.03 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 80 (80,000 psi) yield strength; deformed billet steel bars; unfinished.
- B. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.
- C. Fabricated Bar Mats: Steel bar or rod mats per ASTM A184, using ASTM A615, Grade 60 steel bars.
- D. Dowels: ASTM A615/A615M, Grade 40 - 40,000 psi yield strength; deformed billet steel bars; unfinished finish.
- E. Hook Bolts: ASTM A307, Grade A threaded bolts.
- F. Bar Supports: Bolsters, chairs, spacers, supporting, and fastening reinforcement bars, welded with fabric and dowels in place. Manufacture supports according to CRSI's Manual of Standard Practice.

2.04 CONCRETE MATERIALS

- A. Obtain cementitious materials from same source throughout.
- B. Cement: ASTM C 150, Type I - Normal portland type. grey color
 - 1. Acquire all cement for entire project from same source.
- C. Supplementary Cementitious Materials:
 - 1. Fly Ash: ASTM C618, Type C or F may be used up to a maximum of 25% of the total cementitious materials content in all concrete mixes, unless otherwise noted.
 - 2. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120 maybe used up to a maximum of 35% of the total cementitious material content in all concrete mixes, unless otherwise noted.
 - 3. The exact percentages shall be used on a successful test placement on the project site
- D. Fine and Coarse Aggregates:
 - 1. ASTM C33, Class 3S, normal weight aggregates, uniformly graded, non-exceeding 1-1/2 inch nominal size.
 - 2. ASTM C330, light weight aggregates.
 - 3. Combined aggregate gradation for slabs shall be 8%-18% for large top size aggregate (1 1/2") or 8 - 22% for smaller top size aggregates (1" of 3/4") retained on each sieve below the top size and above the No. 100.
 - 4. Aggregate Supply: Provide aggregate from one source of supply to maintain uniformity of color size and shape.
- E. Water: Clean and not detrimental to concrete.
 - 1. ASTM C94
- F. Air-Entraining Admixtures: ASTM C260/C260M.
 - 1. Acceptable Manufacturers:

- a. Air-Mix or Perma-Air, Euclid Chemical
 - b. Sealtight AEA WR Meadows, Inc.
 - c. Darex AEA or Daravair, WR Grace Company
 - d. Axim Italcementi Group
 - e. Promix
 - f. Substitutions: See Section 01 6000 - Product Requirements.
- G. Chemical Admixtures: ASTM C494/C494M, Type A - Water Reducing.
- 1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

2.05 ACCESSORIES

- A. Curing Compound: ASTM C 309, Type 1, Class A.
 - 1. Clear waterborne membrane-forming curing compound.
 - a. Day Chem Rez Cure: Dayton Superior Corporation
 - b. Diamond Clear Vox: Euclid Chemical Co.
 - c. Safe-Cure Clear; Chem Masters
- B. Bonding Compound: Polyvinyl acetate or acrylic base complying with ASTM C 1059, type II.

2.06 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- C. Admixtures:
 - 1. Use of admixtures: Admixtures, except air entraining mixture, are not allowed except with permission of Architect.
 - 2. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus 1 - 1/2 percent with the following limits:
 - a. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure(all above grade):
 - 1) 6.0 percent(severe exposure) 3/4 inch max. aggregate
 - 2) Other concrete (not exposed to freezing, thawing, or hydraulic pressure or to receive a surface hardener: 2 percent to 4 percent air
 - 3. NO calcium chloride will be permitted.
- D. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- E. Normal Weight Concrete:
 - 1. Compressive Strength, per ASTM C 39 at 28 days: As scheduled.
 - 2. Water-Cement Ratio: Provide concrete for following conditions with maximum water-cement (W/C) ratios as follows:
 - a. Subjected to deicer/watertight and freezing and thawing: W/C 0.45.
 - b. Subjected to brackish water, salt spray, or deicer: W/C 0.40
 - 3. Slump Limits: Proportion and mixes to result in concrete slump a point of placement as follows:
 - a. Slump limit for concrete containing high-range water reducing admixture (superplasticizers): Not more than 8 inches after adding admixture to site-verified 2 to 3 inch slump concrete.
 - b. Ramps, slabs and sloping surfaces: Not more than 4 inches.

- c. Reinforced foundation systems: Not less than 1 inch and not more than 4 inches.
- d. Other concrete: Note less than 1 inch, not more than 4 inches.

2.07 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.
 - 1. When air temperature is between 85 degrees F and 90 degrees F, reduce mixing and delivery time from 1 1/2 hour to 75 minutes, and when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.
 - 2. Use set retarding admixtures during hot weather only when approved by Architect/Engineer.

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 32 11 23 for construction of base course for work of this Section.

3.03 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manhole and catch basin frames with oil to prevent bond with concrete pavement.

3.04 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.

3.05 REINFORCEMENT

- A. Place reinforcement at midheight of slabs-on-grade.
- B. Clean reinforcing of bond reducing material.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement to maintain minimum cover of reinforcement.
- D. Install weld wire fabric in length as long as practical. Lap adjoining pieces at least one full mesh and splices with wire. Off set laps of adjoining width to prevent continuous laps in either direction.
- E. Interrupt reinforcement at expansion joints.

3.06 PLACING CONCRETE

- A. Before placing concrete, inspect, and complete formwork installation, reinforcing steel, and install items to be embedded or cast in. Notify other trades to permit installation of their work.
 - 1. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- B. Moisten subbase to provide a uniform dampened condition at the time concrete is placed.
- C. Place concrete in accordance with ACI 304R.
- D. Ensure reinforcement, inserts, embedded parts, formed joints and [] are not disturbed during concrete placement.
- E. 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.

- F. Consolidate concrete by mechanical vibrating equipment supplemented by rodding or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309R.

3.07 JOINTS

- A. General: Construct contraction, construction and isolation joints true to line with faces perpendicular to surface plan of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.
 - 1. Align curb, gutter, and sidewalk joints.
 - 2. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise
- B. Construction Joint: Set construction joints at side and end termination of paving at locations where paving operations are stopped unless paving terminates at isolation joints.
 - 1. Continue reinforcement across construction joints unless otherwise indicated.
- C. Expansion Joints:
 - 1. Place 1/4 inch wide expansion joints at 20 foot intervals unless otherwise indicated on drawings and to separate paving from vertical surfaces and other components and in pattern indicated.
 - 2. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.
 - 3. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required lace or clip joint filler sections together.
 - 4. Secure to resist movement by wet concrete.
- D. Contraction Joints: Provide weakened-plane contraction joints, section concrete into areas as shown on Drawings. Construct contraction joints for a depth of 1/4 of the concrete thickness.
 - 1. Tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each edge of joint with radiused jointer tool.
 - 2. Inserts: Form contraction joints by inserting premolded plastic, hardboard, or fiber strips into fresh concrete until top surface of strip is flush with concrete. Radius each joint edge with a jointer tool. Carefully remove strips after concrete has hardened. Clean groove of loose debris.
 - 3. Provide joints at five (5) feet intervals if not indicated.

3.08 FINISHING

- A. Nonslip Broom Finish (Ns-Brm-FN): Apply nonslip broom finish to exterior concrete platforms, steps, walks, curbs, gutters and ramps.
 - 1. Immediately after float finishing, slightly roughen concrete by brooming with fiber bristle broom, perpendicular to main traffic route unless otherwise indicated on drawing.
- B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius unless otherwise indicated on drawing.
- C. 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 in 10 ft.
- B. Maximum Variation From True Position: 1/4 inch.

3.10 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 43 00 - Quality Assurance.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

- D. Slump: ASTM C 143, one test for each concrete load at point of discharge, and one for each set of compressive strength test specimens.

3.11 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.12 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian or vehicular traffic over pavement until 75 percent design strength of concrete has been achieved.

END OF SECTION

**SECTION 32 93 00
PLANTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of subsoil.
- B. Topsoil bedding.
- C. New trees, plants, and ground cover.
- D. Mulch and Fertilizer.
- E. Maintenance.
- F. Tree Pruning.

1.02 RELATED REQUIREMENTS

- A. Section 31 22 00 - Grading: Topsoil material.
- B. Section 31 23 23 - Fill: Topsoil material.

1.03 DEFINITIONS

- A. Weeds: Include but not limited to, 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.
- B. Plants: Living trees, plants, and ground cover specified in this Section , and described in ANSI Z60.1.

1.04 REFERENCE STANDARDS

- A. ANSI/AHIA Z60.1 - American National Standard for Nursery Stock 2014.
- B. ANSI A300 Part 1 - American National Standard for Tree Care Operations - Tree, Shrub, and Other Woody Plant Management - Standard Practices (Pruning) 2017.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Maintenance Data: Include cutting and trimming recommendations for plants, owner should be encouraged to not prune plants unless necessary; types, application frequency, and recommended coverage of fertilizer .
- C. Submit list of plant life sources.
- D. Submit watering plan indicating length and duration of watering for owner to continue after final acceptance and owner begins care. With 1 year warranty, it is in the landscapers best interest to assist the owner or contract with them to continue care in a separate contract.

1.06 QUALITY ASSURANCE

- A. Nursery Qualifications: Company specializing in growing and cultivating the plants with three years documented experience.
- B. Installer Qualifications: Company specializing in installing and planting the plants with three (3) years experience of similar size projects,
- C. Plants shall conform to names indicated on the drawings and plant list and to the nomenclature listed in the American Joint Committee on Horticultural Nomenclature' s 'Standardized Plant Names", latest edition.
- D. Size, quality, handling, planting and maintenance of plant materials shall be in accordance with "American Standard of Nursery Stock", American Nursery & Landscape Association. Minimum

acceptable sizes of plants, measured before pruning with branches in normal position, shall conform to measurements specified in the plant list.

- E. Plants shall be subject to the Landscape Architect's inspection and approval at place of growth or upon delivery for conformity to specification requirements. Such approval shall preclude neither right of inspection upon delivery at the site or during progress of work, nor right of rejection at the site due to damage suffered in handling or transportation.
- F. Maintenance Services: Performed by installer.

1.07 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of plants, fertilizer and herbicide mixture.
- C. Plant Materials: Certified by federal department of agriculture; free of disease or hazardous insects.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- B. Prepare, transport and handle plants to ensure protection against injury. Cover all plants while transporting to and from the site.
- C. Deliver plants with legible waterproof identification labels.
- D. Deliver plant life materials immediately prior to placement.
 - 1. Plants shall remain on the site of the work no longer than three days prior to being planted or placed in storage.
 - 2. The earth balls shall be kept moist and their solidity carefully preserved. To prevent drying out or freezing, store plants in a compact group with a suitable mulch material placed around and between the balls so they are completely covered. The duration of storage, method of storage of plants and mulch material shall be acceptable to the Landscape Architect.

1.09 FIELD CONDITIONS

- A. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.
- B. Do not install plant life when wind velocity exceeds 30 mph.
- C. Install plant materials during time periods indicated. Planting operations conducted at other times are at the option and full responsibility of the Contractor and without additional compensation, except as otherwise agreed to by the Landscape Architect and Owner.
 - 1. Plant Materials:
 - a. March 1 to June 1
 - b. September 1 to November 1
 - 2. Groundcover: Spring only, unless otherwise authorized.
 - 3. When planting operations vary, plant early in the day. When planting occurs in the summer, apply anti-desiccant spray to plantings after leaves become full size.

1.10 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Warranty:
 - 1. Guarantee unconditionally labor and plant materials for a period of one year after Landscape Architect's acceptance. Replace at Contractor's expense all plant materials that die during guarantee period. At end of guarantee period, replace all material not showing definite and satisfactory life and growth.

2. During guarantee period, replace plants that die or are, in the Landscape Architect's opinion, in an unhealthy, unsightly, or badly impaired condition. Make no replacements in any season unfavorable for planting. Provide replacement plants of the same kind and size as specified in the plant list, and meeting all requirements of these specifications.
 3. Initial inspection of planting will be made by Landscape Architect at completion of planting. Guarantee period shall begin at date of acceptance.
- C. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

PART 2 PRODUCTS

2.01 PLANTS

- A. Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work.
- B. Plant Materials:
 1. Provide healthy, sound, vigorous plant materials, free from plant diseases, insect pests, or their eggs, with healthy well-developed root systems; freshly dug, nursery-grown, well-branched, densely foliated when in leaf, and well-proportioned, particularly with respect to the width-height relationship, hardy under climatic conditions similar to those of the project.
 2. Damaged or broken branches, broken ball, and loose top in ball are not acceptable. Provide balled and burlapped plants, designated B&B, adequately balled with firm natural balls as set forth in the ASNS. Firmly wrap balls with burlap or approved cloth secured in place.
 3. Obtain the Landscape Architect's specific written approval for substitution of plants other than those named in the plant list. Proposed substitutes shall have essentially the same characteristics as plants specified in appearance, ultimate height, shape, habit of growth, general soil and other requirements. Average cost and value of substituted plants shall be no less than cost and value of plants specified. Plants of greater value may be accepted without additional cost to the Owner.
 4. Provide container-grown stock with root system sufficiently developed to hold soil together, firm and whole. No plants shall be loose in containers; nor pot-bound.
 5. Size range and measurement of height and caliper of all material shall be as specified in the ASNS.

2.02 SOIL MATERIALS

- A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; minimum pH value of 5.4 and maximum 7.0.
- B. Topsoil to contain 3-8 organic matter
- C. Soil shall have the following USDA particle size analysis. Sand, silt and clay shall be determined by ASTM D422
 1. Gravel: Plus 2mm. Less than 10%
 2. Sand: .05mm to .2mm. 15-40%
 3. Silt: .002 to .05mm. 25-65%
 4. Clay: minus .002mm. 20-35%

2.03 SOIL AMENDMENT MATERIALS

- A. Fertilizer: Containing fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated in analysis..
- B. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight, pH range of 4 to 5; moisture content of 30 percent.

- C. Composted Organic Material: Mature, stable humus-like material derived from aerobic decomposition. The compost shall be dark brown to black in color and capable of supporting plant growth.
 - 1. Carbon to Nitrogen ratio not to exceed 35 to 1.
- D. Bone Meal: Raw, finely ground, commercial grade, minimum of 3 percent nitrogen and 20 percent phosphorous.
- E. Lime: Ground limestone, dolomite type, minimum 95 percent carbonates.
- F. Water: Clean, fresh, and free of substances or matter that could inhibit vigorous growth of plants.

2.04 MULCH MATERIALS

- A. Mulching Material: Hardwood species wood shavings, free of growth or germination inhibiting ingredients containing no sticks larger than 1/4 inch in diameter, stones, clay or other foreign material that will prevent eventual decay of the mulch necessary for its complete effectiveness.

2.05 ACCESSORIES

- A. Edging: All plant beds are to have a 45 degree angle spade formed edge.
- B. Anti-desiccant: "Wilt-pruf", Nursery Specialty Products, Inc., New York or equal.

2.06 PLANT SOIL MIX

- A. For planting soil mixture and backfill for plants, provide not less than the following quantities of specified materials:
 - 1. 65-75% sand
 - 2. 17-30% topsoil
 - 3. 5-8% composed organics
 - 4. 3-5 lbs of commercial fertilizer per 100 square feet of bed area for shrubs.
 - 5. Provide soil amendment materials of types and proportions needed based upon soil test results.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared, amended subsoil is in place in planters and plan beds are ready to receive work.
- B. Saturate soil with water to test drainage.
 - 1. Notify Landscape Architect if water sits in hole when surrounding ground is not saturated.

3.02 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 3 inches where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
- D. Dig pits and beds 6 inches larger than plant root system.

3.03 PLACING TOPSOIL FOR PLANT BEDS

- A. Spread topsoil to a minimum depth of 18 inches over area to be planted. Rake smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.

- E. Install topsoil into pits and beds intended for plant root balls, to a minimum thickness of 6 inches.

3.04 FERTILIZING

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after initial raking of topsoil.
- C. Mix thoroughly into upper 2 inches of topsoil.
- D. Lightly water to aid the dissipation of fertilizer.

3.05 PLANTING

- A. Place plants for best appearance.
- B. Set plants in center of pits plumb and straight and at such a level that after settlement, plants will bear same relation to finished grade of surrounding ground as to grade of ground from which plants were dug.
- C. Remove non-biodegradable root containers.
- D. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth of 6 inches under each plant. Remove burlap, ropes, and wires, from the root ball.
- E. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch layers. Maintain plant life in vertical position.
- F. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

3.06 TREE PRUNING

- A. Prune trees as recommended in ANSI A300 Part 1.
- B. Prune newly planted trees as required to remove dead, broken, and split branches.
- C. Prune existing plant material that has been behind protection fencing as needed to maintain shape and remove dead or broken branches.

3.07 PRUNING OVERGROWN EXISTING MATERIAL

- A. Prune, limb and thin plant material after construction to return it to its natural shape and to work with new plantings. Prune and remove any dead plant material at no additional cost to City of Greenville.

3.08 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 43 00.
- B. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

3.09 MAINTENANCE

- A. Provide maintenance at no extra cost to City of Greenville; City of Greenville will pay for water.
- B. Maintain plant life immediately after placement and until plants are well established and exhibit a vigorous growing condition. Continue maintenance until acceptance of job by Landscape Architect.
- C. Irrigate sufficiently to saturate root system and prevent soil from drying out.
- D. Cultivate and weed plant beds and tree pits.
- E. Remove dead or broken branches and treat pruned areas or other wounds.
- F. Neatly trim plants where necessary.
- G. Immediately remove clippings after trimming.
- H. Water to prevent soil from drying out.
- I. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.

- J. Control insect damage and disease. Apply pesticides in accordance with manufacturers instructions.
- K. Remedy damage from use of herbicides and pesticides.
- L. Replace mulch when deteriorated.
- M. Maintain wrappings, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.

3.10 ADJUST AND CLEAN

- A. Upon completion of planting and prior to acceptance, remove excess soil and debris from site and repair all damage to structures and site improvements, resulting from planting operations.
- B. Sweep and hose down paved surfaces affected by planting operations.

END OF SECTION

**SECTION 33 42 11
STORMWATER GRAVITY PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Storm drainage piping, fittings, and accessories.
- B. Connection of drainage system to municipal system and building downspouts.
- C. Catch basins, Plant area drains, Paved area drainage, and Site surface drainage.

1.02 RELATED REQUIREMENTS

- A. Section 31 23 16 - Excavation: Excavating of trenches.
- B. Section 31 23 23 - Fill: Bedding and backfilling.

1.03 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.04 REFERENCE STANDARDS

- A. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe 2022a.
- B. ASTM C76M - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric) 2022a.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating pipe, pipe accessories, and storm structures.
- C. Project Record Documents:
 - 1. Record location of pipe runs, connections, catch basins, cleanouts, and invert elevations.
 - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code formaterials and installation of the Work of this section.
- B. Environmental Agency Compliance: Comply with regulations pertaining to storm sewerage systems.
- C. Utility Compliance: Comply with regulation pertaining to strom sewerage systems where appropriate, ie connections into utility system

1.08 DELIVERY, STORAGE AND HANDLING

- A. Do not store plastic, catch basins, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seal from dirt and damage.
- C. Handle catch basins according to manufacturer's written rigging instructions.

1.09 PROJECT CONDITIONS

- A. Coordinate the Work with termination of storm sewer connection outside building, trenching, connection to foundation drainage system and municipal sewer utility service.
- B. Existing Sewers or Drain Lines.

1. When existing sewers are encountered, whether indicated on the drawings or not, adequate provisions shall be made for diverting the flow of such existing sewers so that the excavation will be kept dry during the progress of construction.
 2. Reroute existing sewer encountered as required to maintain proper functioning. Before completion of the construction work, the existing sewers shall be restored and/or provided with adequate outlet as directed by the Architect. Under no conditions shall the underground lines be abandoned or plugged until sufficient test have been made to indicate that it is not functioning line.
 3. Reconnect existing drain lines which are to remain in service and which would otherwise be cut off and blocked by new work.
- C. Public Right-Of-Way
1. Sewer to be installed in public right of ways, including right-of-way that are to be dedicated to public use, shall be constructed in strict accordance with standards, methods and requirements of the authority having jurisdiction. Other Work occurring on the Owner's property or adjacent property within contract limits shall be installed in accordance with the requirements of this Section.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

- A. Concrete Pipe (any size): Reinforced, ASTM C 655 and ASTM C 76, Class II with Wall type A; mesh reinforcement; inside nominal diameter of inches shown on the drawings, bell and spigot end joints.
- B. Plastic Pipe: (30 inch diameter and smaller) Corrugated Polyethylene Smooth Lined Pipe AASHTO M-294 Type S, or SP inside nominal diameter of inches shown on the drawings, bell and spigot or bell and spigot coupling end joints.
- C. Plastic Pipe: (4 inch to 15 inch diameter) Polyvinyl Chloride Solid Wall Pipe, ASTM D 3034, SDR-35, inside nominal diameter of inches shown on the drawings.
- D. Perforated Piping (finger drains): 4 inch polyethylene tubing ASTM M 252 C with perforations and silt sock.
 1. Manufacturer:
 - a. Hancor Inc.
 - b. Crumpler Plastic Pipe Inc.
 - c. Haviland Drainage Company.
 - d. Advanced Drainage Systems Inc.
 - e. Substitutions: See Section 01 6000 - Product Requirements

2.02 PIPE ACCESSORIES

- A. Pipe Joints: Mechanical clamp ring type, stainless steel expanding and contracting sleeve, neoprene ribbed gasket for positive seal.
- B. 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.
- C. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Storm Sewer Service " in large letters.

2.03 INLETS

- A. Precast Concrete Catch Basin: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated with provisions for rubber gasket joints.
 1. Base Section: 6 inch minimum thickness for floor slab and 8 inch minimum thickness for walls and base riser section, and having a separate base slab or base section with integral floor.
 2. Riser Section: 6 inch minimum thickness, 24 inch square or 24 inch diameter and lengths to provide depth indicated.

3. Gaskets: ASTM C443 (ASTM C 443M) rubber
4. Grade Rings: Include 2 or 3 reinforced-concrete ring of 5 to 9 inch total thickness, that match a 24 inch diameter frame and cover.
5. Pipe Connections: ASTM C923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.

2.04 CATCH BASINS

- A. Precast Concrete Catch Basin: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated with provisions for rubber gasket joints.
 1. Base Section: 6 inch minimum thickness for floor slab and 8 inch minimum thickness for walls and base riser section, and having a separate base slab or base section with integral floor.
 2. Riser Section: 8 inch minimum thickness, 24 inch square or 24 inch diameter and lengths to provide depth indicated.
 3. Gaskets: ASTM C443 (ASTM C 443M) rubber
 4. Grade Rings: Include 2 or 3 reinforced-concrete ring of 5 to 9 inch total thickness, that match a 24 inch diameter frame and cover.
 5. Pipe Connections: ASTM C923 (ASTM C 923M), resilient, of size required, for each pipe connecting to base section.
- B. Catch Basin Frame and Covers:
 1. Neenah:
 - a. Paved areas: Product R- 3405
 - b. Non Paved areas: Product R-4859-C
 2. East Jordon Iron Works;'
 - a. Paved areas: Product 5250
 - b. Non Paved areas: Product 5100 M3
 3. Barry Pattern and Foundry Company:
 - a. Paved areas: B1867-A.
 - b. Non Paved areas: B5294
 4. Substitutions: See Section 01 6000 - Products Requirements

2.05 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 31 23 23.
- B. Cover: As specified in Section 31 23 23.

PART 3 EXECUTION

3.01 LAYOUT

- A. The work under this section shall include the making of a complete layout on the site of the storm sewer system verifying the layout and grade correspond with the design drawings. Any deviation in location or grade shall be called to the architects attention for written direction before proceeding with the work. Perform layout with other trades in establishing the exact routing, and points of connection with the work of other contractors.
- B. Verify location of existing utilities before commencing work. Care must be taken to avoid contact or injury to electrical, fiber, underground and underground utilities.
- C. Sizes referred to on drawings refer to nominal inside diameter dimension unless otherwise noted.

3.02 TRENCHING

- A. See Section 31 23 16 - Excavation and Section 31 23 23 - Fill for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. A dry trench must be maintained to avoid sediment into the system.

- D. 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.
- C. Make joints using system manufacturer's couplings unless otherwise indicated. Join piping of different materials or dimensions with couplings compatible with different materials.
- D. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.
- E. Connect to building storm drainage system, foundation drainage system, and utility/municipal sewer system.
- F. Use manholes for changes in direction, except where fittings are indicated.
- G. Connect to municipal storm sewer system .
- H. Install continuous trace wire 6 inches above top of pipe; coordinate with Section 31 2323 .

3.04 INSTALLATION - CATCH BASINS

- A. General: Install catch basins, complete with accessories, as indicated
- B. Form continuous concrete channels and benches between inlets and outlets unless noted otherwise.
- C. Place precast concrete manhole sections as indicated, and install according to ASTM C891.
- D. Construct cast in place manholes as indicated.

3.05 INSTALLATION - INLETS

- A. General: Install catch basins, complete with accessories, as indicated
- B. Form continuous concrete channels and benches between inlets and outlets unless noted otherwise.
- C. Place precast concrete manhole sections as indicated, and install according to ASTM C891.
- D. Construct cast in place manholes as indicated.

3.06 FIELD QUALITY CONTROL

- A. Perform field inspection in accordance with Section 01 43 00 - Quality Assurance.
- B. Clear interior of piping and structures of dirt and superfluous material as the work progresses
 - 1. Flush piping between manholes and other structures, if required by authorities having jurisdiction, to remove collected debris.
- C. Contact the architect for visual field inspection before backfilling commences.
 - 1. Inspect interior of piping for displacement or other damage after approximately 24 inches of backfill is in place.
 - 2. Inspect piping for alignment, deflection, crushed or damaged piping and infiltration and exfiltration.
 - a. Alignment: Less than a full diameter of inside of pipe is visible between structures.
 - b. Deflection: Prevents passage of a ball or cylinder of a size not less than 92.5 percent of piping diameter
 - c. Infiltration: Water leaking into piping
 - d. Exfiltration: Water leaking from or around piping.
 - e. Replace defective piping using new material.
 - f. Replace defective piping using new material.

- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to City of Greenville.

3.07 PROTECTION

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION