

BID DOCUMENTS PROJECT MANUAL

FOR

Tipp City Government Center Infill Addition

260 S Garber Drive
Tipp City, Ohio, 45371

OWNER

City of Tipp City
260 S Garber Drive
Tipp City, Ohio, 45371

Book 1 of 1



Minster, OH | Columbus, OH | Indianapolis, IN

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22094.00 Tipp City Government

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Division 00

Procurement Requirements

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ADVERTISEMENT FOR BIDS

Sealed proposals will be received for the Tipp City Government Center Renovation Project will be received at the Tipp City Government Center, 260 S Garber Drive, Tipp City, Ohio 45371, until **Thursday, March 23, 2023 at 11:00.00 AM**, at which time and place proposals will be opened publicly and read aloud. Proposals received after Thursday, March 23, 2023 at 11:00.00 AM will be returned unopened. Proposals shall be for the furnishing of materials and the performance of labor necessary for the:

Tipp City Government Center Renovation Project
260 S Garber Drive
Tipp City, Ohio, 45371

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.**

A prebid meeting will be held at 2:00 PM on Thursday, March 2, 2023 at 260 S Garber Drive, Tipp City, Ohio 45371. The pre-bid meeting is not mandatory but bidders are strongly encouraged to attend. The facility will be open for inspection at this time.

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.

Successful Bidders shall conform to the Ohio "Schedule of Prevailing Wages". The bidder may access the Ohio Department of Commerce, Wage & Hour Bureau at its web site for current edition of wage rates.

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 Tipp City; 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 bidder's 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 Tipp City web site. Notice can be accessed at <https://tippcityohio.gov/bids.aspx>

The Date of this notice: February 22, 2023
City of Tipp City
260 S Garber Drive
Tipp City, OH 45371

Bids shall be enclosed in a sealed envelope marked:

City of Tipp City
Government Center Renovation Project

And addressed to the attention:

Doug Arnold
260 S. Garber dr.
Tipp City, Ohio 45371

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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: 22094.00 Tipp City Government Center Infill Addition
260 S Garber Drive
Tipp City, Ohio 45371

GM Project Number: 22094.00

Bid Date: Thursday, March 23, 2023 at 11:00.00 AM

Bid Categories: Lump Sum General Contract

Estimate of Construction Cost: \$ 1,896,000

PROJECT SCOPES OF WORK

General Construction:

The scope of work consists of an infill addition to the existing building. The scope includes selective demolition of existing masonry walls. There will be construction of new masonry walls and metal stud walls with gypsum wallboard and acoustic batt insulation, new acoustic ceiling tile ceiling, new flooring, painting, and a small amount of fixed casework. There are new wood doors with hollow metal frames and aluminum storefront included in the scope. The scope also includes a new roof and re-roof of the existing building.

Site Work:

Site scope consist of concrete demo, asphalt demo, stair demo, new concrete pavement, handicap ramp with railings, concrete curb and patching of asphalt pavement. A new sanitary line will connect into existing sanitary on site.

Fire Protection Work:

The scope of work consists of extension of an existing fire suppression system zone and new hydraulic calculations for zone. Verify existing size, type and location on site. Technology room shall be a separate fire suppression system that will not harm the technology room equipment.

Plumbing Work:

The scope of work consists of extension of existing domestic hot and cold water, and natural gas piping. A new sanitary line for various new plumbing fixtures including service sink, lavatory, water closet, and floor drains.

HVAC Work:

The scope of work consists of packaged roof top unit, technology room ac units, exhaust fan, electric cabinet heater, ductwork, diffusers, duct accessories and related work.

Electrical Work:

The scope of work consists of demolition of, but not limited to receptacles, fire alarm devices, light fixtures and lighting controls, and new, but not limited to, lighting and appliance panelboard, LED lighting, standalone lighting controls with vacancy sensors, fire alarm devices, rough-ins for technology (cabling by owner), receptacles, connections for mechanical and plumbing equipment and raceways for the extension of existing lightning protection system (designed and installed by Maxwell Lightning Protection).

END OF SECTION

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AIA[®] Document A701[™] – 2018

Instructions to Bidders

for the following Project:

(Name, location, and detailed description)

Tipp City Government Center Infill Addition
260 S. Garber Drive
Tipp City, Ohio 45371

THE OWNER:

(Name, legal status, address, and other information)

City of Tipp City
260 S. Garber Drive
Tipp City, Ohio 45371

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 2 Bidder's Representations

Add the following to Article 2

2.2 A prebid meeting will be held at 2:00 PM on Thursday, March 2, 2023 at 260 S Garber Drive, Tipp City, Ohio 45371. The pre-bid meeting is not mandatory but bidders are strongly encouraged to attend. The facility will be open for inspection at this time.

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 fax, 419-628-4299 or telephone, 419-628-4240 or email to Andrew Huelsman; ahuelsman@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 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 by Choice One Engineering, dated 10/20/2022.
 - 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

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

TO:

City of Tipp City
260 S Garber Drive
Tipp City, Ohio45371

FOR:

Project: 22094.00 Tipp City Government Center Infill Addition
Project Number: 22094.00
260 S Garber Drive
Tipp City, Ohio45371

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 21 00 are included in the Bid Sum.

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 Owner 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 Owner by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.

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: April 15, 2023

Owners desired completion date: March 15, 2024

If this Bid is accepted, we will:

Complete the Work by March 15, 2024 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:
City of Tipp City
260 S Garber Drive
Tipp City, Ohio 45371

END OF BID FORM

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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

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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

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**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

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 **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 Twenty-fourth day of August in the year Two Thousand Twenty-two
(In words, indicate day, month and year.)

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

City of Tipp City
260 S. Garber Drive
Tipp City, Ohio 45371

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

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

Tipp City Government Center Infill Addition
260 S. Garber Drive
Tipp City, Ohio 45371

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. 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.

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.

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:

Init.

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User Notes:

(3B9ADA3F)

(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)

Doug Arnold
260 S. Garber Drive
Tipp City, Ohio 45371

§ 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:

Init.

(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)*

Doug Arnold

(Printed name and title)

CONTRACTOR *(Signature)*

(Printed name and title)

Init.

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 Tipp City, its successors and assigns on the job site located at: 260 S Garber Drive, Tipp City, Ohio 45371.

This release covers a progress payment for labor, material, and equipment furnished on the Tipp City Government Center Infill Addition.

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: 22094.00 Tipp City Government Center Infill Addition, 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

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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

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AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

Tipp City Government Center Infill Addition
260 S. Garber Drive
Tipp City, Ohio 45371

THE OWNER:

(Name, legal status and address)

City of Tipp City
260 S. Garber Drive
Tipp City, Ohio 45371

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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- 12 UNCOVERING AND CORRECTION OF WORK
- 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.

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15 CLAIMS AND DISPUTES



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User Notes:

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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

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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:

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- .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 Tipp City
260 S Garber Drive
Tipp City, Ohio 45371

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 60 00 - 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 30 00 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

Division 01

General Requirements

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**SECTION 01 11 00
SUMMARY OF WORK**

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: 22094.00 Tipp City Government Center Infill Addition
- B. Owner's Name: City of Tipp City.
- C. Architect's Name: Garmann / Miller & Associates Inc.
- D. The Project consists of the construction of an office building infill addition to the existing government center.
- E. The project is a signature project for the Owner and construction of the highest quality facility is vitally important in this respect, each contractor assumes a position of trust confidence in the performance of its duties to the Owner and shall perform its work on the project with the highest degree of competence, diligence, cooperation and workmanship.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 52 13 - AIA A101 Standard Form Of Agreement

1.03 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of demolition and removal work is indicated on drawings and specified in Section 02 41 00.
- B. Scope of alterations work is indicated on drawings.

1.04 WORK BY OWNER

- A. Items noted NIC (Not in Contract) will be supplied and installed by Owner before Substantial Completion. Some items include:
 - 1. Movable cabinets.
 - 2. Furnishings.
 - 3. Small equipment.
 - 4. Artwork.
 - 5. Technology cabling, devices, and equipment are by owner. Rough-ins are included in the project base bid.

1.05 FUTURE WORK

- A. Project is designed for future office and technology spaces.

1.06 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Owner intends to occupy the Project upon Substantial Completion.
- C. Schedule the Work to accommodate Owner occupancy.

1.07 WORK SEQUENCE

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

1.08 CONTRACT NO. A - GENERAL CONSTRUCTION

- A. Provide all Work except Work specifically assigned to other contractors in this Section.

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.
- C. Section 01 78 00 - Closeout Submittals: Project record documents.

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 Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
 - 1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
 - 2. Promptly execute the change.
- 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 \$90,000.00 for use upon Owner's instructions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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**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. 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.

1.04 PROJECT COORDINATOR

- A. Project Coordinator: General Contractor.
- B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for site access, traffic, and parking facilities.
- C. During construction, coordinate use of site and facilities through the Project Coordinator.
- D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 11 00 - Summary of Work.
- F. Coordinate field engineering and layout work under instructions of the Project Coordinator.
- G. Make the following types of submittals to Architect through the Project Coordinator:
 - 1. Requests for Interpretation.
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Manufacturer's instructions and field reports.
 - 5. Applications for payment and change order requests.
 - 6. Progress schedules.
 - 7. Coordination drawings.
 - 8. Correction Punch List and Final Correction Punch List for Substantial Completion.
 - 9. 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. Owner.
 - 2. Architect.
 - 3. Contractor.
 - 4. All Major Subcontractors.
- C. Agenda:
 - 1. Execution of Owner-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.
 - 8. Scheduling activities of Special Inspector required by the Authority having Jurisdiction.
- D. Record minutes and distribute electronic copies within two days after meeting to participants, with an electronic copy to Architect, Owner, participants, and those affected by decisions made.

3.02 SITE MOBILIZATION MEETING

- A. Project Coordinator will schedule meeting at the Project site prior to Contractor occupancy.
- B. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 3. Architect.
 - 4. Contractor's superintendent.
 - 5. Major subcontractors.
- C. Agenda:
 - 1. Use of premises by Owner and Contractor.
 - 2. Owner's requirements.
 - 3. Construction facilities and controls provided by Owner.
 - 4. Temporary utilities provided by Owner.
 - 5. Survey and building layout.
 - 6. Security and housekeeping procedures.
 - 7. Schedules.
 - 8. Application for payment procedures.
 - 9. Procedures for testing.
 - 10. Procedures for maintaining record documents.
 - 11. Requirements for start-up of equipment.
 - 12. Inspection and acceptance of equipment put into service during construction period.
- D. Record minutes and distribute electronic copies within two days after meeting to participants, with an electronic copy to Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

- A. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

- B. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 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. Scheduling activities of Special Inspector required by the Authority having Jurisdiction
 - 14. 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, Owner, participants, and those affected by decisions made.

3.04 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 a the conference at the earliest feasible date

3.05 CONSTRUCTION PROGRESS SCHEDULE

- A. Phasing Schedule

1. Phasing Schedule attached to Section 01 11 00 - Summary of the Work.
 2. Note that only major categories of work are shown on the Phasing Schedule. Each Contractor shall use the information shown on these schedules to understand the overall project flow, concurrent activities and milestones relating to his Contract.
- B. 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.
- C. Within 10 days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.

3.06 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.

3.07 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.

3.08 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. 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.

3.09 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 1. Design data.
 2. Certificates.
 3. Test reports.
 4. Inspection reports.
 5. Manufacturer's instructions.
 6. Manufacturer's field reports.
 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

3.10 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 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 Owner's benefit during and after project completion.

3.11 SUBMITTAL PROCEDURES

- A. General Requirements:
- B. 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.
- C. 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.

- D. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- E. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
- F. 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.
- G. Schedule submittals to expedite the Project, and coordinate submission of related items.
- H. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- I. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- J. Provide space for Contractor and Architect review stamps.
- K. When revised for resubmission, identify all changes made since previous submission.
- L. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- M. Submittals not requested will not be recognized or processed.

3.12 ELECTRONIC FILES

- A. Architects' Electronic Digital Files: Electronic copies of CAD Drawings of the Contract Drawings will be provided by the Architect for Contractor's use in preparing submittals. The Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings through an electronic digital file agreement.
 - 1. Electronic Digital Agreement: Electronic Digital files will be distributed to Contractors upon completion of AIA Document C106 - 2013, Digital Data Licensing Agreement as modified by the Architect for this project.

END OF SECTION



38 South Lincoln Drive
P.O. Box 71
Minster, Ohio 45865

1156 Dublin Road
Suite 102
Columbus, Ohio 43215

2 West Main Street
Camel, Indiana 46032

creategm.com

Project name : _____

Contractor name : _____

Contact name : _____

Phone : _____

Subcontractor

Company : _____

Contact name : _____

Phone number : _____

Submittal # : _____

Date : _____

Description : _____

Specification section(s) : _____

- Product data
- Shop drawings
- VOC compliance form
- Maintenance data
- LEED MR form
- Samples
- Warranty

Other: _____

Contractor stamp

Architect stamp

Consultant stamp

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**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. Mock-ups.
- G. Manufacturers' field services.
- H. Defect Assessment.
- I. Cost of testing: The Owner will employ services of an independent testing agency to perform specified testing and inspections.

1.02 RELATED REQUIREMENTS

- A. Document 00 31 19 - Existing Condition Information: Soil investigation data.
- B. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- C. 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 Owner'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 Owner.
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 Owner.

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. Owner 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 MOCK-UPS

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.
- C. General:
 - 1. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
 - 2. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
 - 3. Accepted mock-ups shall be a comparison standard for the remaining Work.
 - 4. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.
- D. Masonry Exterior Wall Mock Up
 - 1. Construct an exterior wall mock up panel as shown on the drawings.
 - 2. Locate where directed. Finished face to be facing south.
 - 3. Build mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials, execution, and aesthetic effect.
 - 4. Build masonry mock-up of typical wall area(s) as shown on Drawings including Movement Control Joints (Sealant Filled) 1'4" (minimum length), Air Barrier, Cavity Insulation,

Foamed-in-Place Insulation, Blocking for Window, Horizontal and Vertical Reinforcing, Shelf Angles and Supports, Bond Beams and Lintels, Brick Ties and Anchors Flashing, End Dams, Weeps and Vents, Cavity Drainage Material (if required), Window Head, Sill and Jamb Details.

- a. Include a sealant-filled joint at least 16 inches long in each exterior wall mock-up.
 - b. Include lower corner of window opening at upper corner of exterior wall mock-up. Make opening approximately 12 inches wide by 16 inches high.
 - c. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mock-up approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
 - d. Prior to starting general masonry cleaning, prepare mock-up for cleaning using the same cleaning materials and methods proposed for the Work.
 - e. Protect accepted mock-ups from the elements with weather-resistant membrane.
 - f. The construction of the mock-up shall be photographed or videotaped by the masonry contractor to be part of a presentation for groups of trades people as they join the project work force.
5. The window contractor shall provide and install in the mock-up wall a sample window of the type and profile used. (leaving portions of the perimeter exposed for inspection of the fasteners and air barrier transition to the masonry some portions to receive final caulking inside and out)
6. Observation and evaluation of the mock-up shall be by:
- a. The Architect
 - b. Construction Manager
 - c. General Trades Contractor
 - d. Masonry Contractor
 - e. Window Installer
 - f. Testing Agency

3.03 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 Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.04 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.

3.05 DEFECT ASSESSMENT

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

END OF SECTION

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MASONRY INSPECTION REPORT					
Garmann-Miller Architects/Engineers			Report No.: _____		
			Date: _____		
Project: _____			Weather: _____		
City, State: _____			Temp 7:00am: _____		
Project No: _____			Temp 3:00pm: _____		
Inspecting Agency: _____			Masonry Contractor: _____		
Name of Inspector: _____			Superintendent: _____		
Panel No.:					
On Grid Line:					
Between Grid Lines:					
Elev (Above Fin Flr):					
Nom CMU Size:					
CMU Laid Surface Dry					
Full Face Shell Mortar Bed Jt.					
Full Mortar Head Joint					
Cores Clear of Debris & Mortar					
Vert Reinf Bar Size					
Vert Reinf Bar Lap					
Centering Clips Used					
Grout Type (Coarse/Fine)					
Height of Grout Lift					
Grout Test Specimen No.					
Grout Vibrated					
Bond Beam Reinf Bar Size					
Bond Beam Reinf Bar Lap					
Spacers on Bond Beam Bars					
Reinf Lapped at Corners					
Bond Beams Grouted					
Masonry Anchors to Steel					
Masonry Lintel Reinf Tied					
Masonry Lintel Reinf Positioned					
Cores Grouted on Steel Lintel					
Cores Grouted Full Ht at Beams					
Remarks/Comments					

Insert y for Yes, n for No or sizes and dimensions as required. Insert N/A for not applicable

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**SECTION 01 45 33
CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Code-required special inspections.
- B. Testing services incidental to special inspections.
- C. Submittals.
- D. Manufacturers' field services.

1.02 RELATED REQUIREMENTS

- A. Document 00 31 19 - Existing Condition Information: Soil investigation data.
- B. Section 01 30 00 - Administrative Requirements: Submittal procedures.
- C. Section 01 43 00 - Quality Assurance.
- D. Section 01 60 00 - Product Requirements: Requirements for material and product quality.

1.03 DEFINITIONS

- A. Code or Building Code: ICC (IBC)-2015, Edition of the International Building Code and specifically, Chapter 17 - Special Inspections and Tests.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
- C. National Institute of Standards and Technology (NIST).
- D. Special Inspection:
 - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
 - 2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.04 REFERENCE STANDARDS

- A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary 2011.
- B. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.
- C. AISC 360 - Specification for Structural Steel Buildings 2010.
- D. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field 2012.
- E. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete 2010.
- F. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction 2019.
- G. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing 2014a.
- H. AWS D1.1/D1.1M - Structural Welding Code - Steel 2015.
- I. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel 2008.
- J. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel 2011.
- K. ICC (IBC) - International Building Code 2015.

L. ICC (IBC)-2015 - International Building Code 2015.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
 - 1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
 - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
 - 3. Submit certification that Special Inspection Agency is acceptable to AHJ.
- C. Manufacturer's Qualification Statement: Manufacturer is required to submit documentation of manufacturing capability and quality control procedures. Include documentation of AHJ approval.
- D. Fabricator's Qualification Statement: Fabricator is required to submit documentation of fabrication facilities and methods as well as quality control procedures. Include documentation of AHJ approval.
- E. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to the AHJ.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of Special Inspector.
 - d. Date and time of special inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of special inspection.
 - h. Date of special inspection.
 - i. Results of special inspection.
 - j. Compliance with Contract Documents.

1.06 SPECIAL INSPECTION AGENCY

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

1.07 TESTING AND INSPECTION AGENCIES

- A. Owner or Architect may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.
 - 1. Allowance will pay for the employment of the independent testing agency
- B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

- A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.

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

3.02 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION

- A. Structural Steel: Comply with quality assurance inspection requirements of ICC (IBC).
- B. High-Strength Bolting Installation: Verify items listed below comply with AISC 360, Section M2.5.
 1. Snug tight joints; periodic.
- C. Structural Steel and Cold Formed Steel Deck Material:
 1. Structural Steel: Verify identification markings comply with AISC 360, Section M3.5; periodic.
 2. Other Steel: Verify identification markings comply with ASTM standards specified in the approved Contract Documents; periodic.
- D. Welding:
 1. Structural Steel and Cold Formed Steel Deck:
 - a. Complete and Partial Joint Penetration Groove Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
 - b. Multipass Fillet Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
 - c. Single Pass Fillet Welds Less than 5/16 inch Wide: Verify compliance with AWS D1.1/D1.1M; periodic.
 - d. Plug and Slot Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
 - e. Single Pass Fillet Welds 5/16 inch or Greater: Verify compliance with AWS D1.1/D1.1M; continuous.
 - f. Floor and Roof Deck Welds: Verify compliance with AWS D1.3/D1.3M; continuous.
 2. Reinforcing Steel: Verify items listed below comply with AWS D1.4/D1.4M and ACI 318, Section 3.5.2.
 - a. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames as well as boundary elements of special structural walls of concrete and shear reinforcement; continuous.
 - b. Shear reinforcement; continuous.
 - c. Other reinforcing steel; periodic.
- E. Steel Frame Joint Details: Verify compliance with approved Contract Documents.
 1. Details, bracing and stiffening; periodic.
 2. Member locations; periodic.
 3. Application of joint details at each connection; periodic.

3.03 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

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

- D. Specified Curing Temperature and Techniques: Verify compliance with approved Contract Documents and ACI 318, Sections 5.11 through 5.13; periodic.
- E. Concrete Strength in Situ: Verify concrete strength complies with approved Contract Documents and ACI 318, Section 6.2, for the following.
- F. Formwork Shape, Location and Dimensions: Verify compliance with approved Contract Documents and ACI 318, Section 6.1.1; periodic.
- G. Materials: If the Contractor cannot provide sufficient data or documentary evidence that concrete materials comply with the quality standards of ACI 318, the AHJ will require that the Special Inspector verify compliance with the appropriate standards and criteria in ACI 318, Chapter 3.

3.04 SPECIAL INSPECTIONS FOR MASONRY CONSTRUCTION

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

3.05 SPECIAL INSPECTIONS FOR SOILS

- A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
 - 1. Design bearing capacity of material below shallow foundations; periodic.
 - 2. Design depth of excavations and suitability of material at bottom of excavations; periodic.

3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
4. Subgrade, prior to placement of compacted fill verify proper preparation; periodic.

B. Testing: Classify and test excavated material; periodic.

3.06 SPECIAL INSPECTIONS FOR VERTICAL MASONRY FOUNDATION ELEMENTS

A. Vertical Masonry Foundation Elements are subject to the same special inspection requirements listed in the "Special Inspections for Masonry Construction" Article of this section.

3.07 SPECIAL INSPECTIONS FOR WIND RESISTANCE

A. Structural Observations for Wind Resistance: Visually observe structural system for general compliance with the approved Contract Documents; periodic.

3.08 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

A. Special Inspection Agency shall:

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 reference standards.
3. Ascertain compliance of materials and products 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 or inspections specified.

B. Limits on Special Inspection Agency Authority:

1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

C. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

D. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.09 TESTING AGENCY DUTIES AND RESPONSIBILITIES

A. Testing Agency Duties:

1. 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 or inspections specified.

B. Limits on Testing or Inspection Agency Authority:

1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

- C. On instructions by Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.
- D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

3.10 CONTRACTOR DUTIES AND RESPONSIBILITIES

- A. Contractor Responsibilities, General:
 - 1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
 - 2. Cooperate with agency and laboratory personnel; provide access to approved documents at project site, to the work, to manufacturers' facilities, and to fabricators' facilities.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to work to be tested or inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
 - c. To facilitate tests or inspections.
 - d. To provide storage and curing of test samples.
 - 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing or inspection services.
 - 5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

END OF SECTION

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

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary telecommunications services.
- B. Temporary sanitary facilities.
- C. Temporary Controls: Barriers, enclosures, and fencing.
- D. Security requirements.
- E. 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.
- B. Use of existing facilities located at [] is not permitted.

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 INTERIOR ENCLOSURES BY GENERAL CONTRACTOR

1.09 SECURITY

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

1.10 VEHICULAR ACCESS AND PARKING

- A. Coordinate access and haul routes with governing authorities and Owner.

1.11 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.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.12 FIELD OFFICES BY GENERAL CONTRACTOR

- A. Locate offices a minimum distance of 30 feet from existing and new structures.

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. 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:
 - 1. Electrical Contractor to pay to connect and disconnect to the utilities service, provide temporary lighting and power distribution system for each area and/or floor of the project, and service to General Contractor field office.
- B. Cost: By Owner.
- C. Connect to Owner's existing power service.
 - 1. Do not disrupt Owner's need for continuous service.
 - 2. Exercise measures to conserve energy.
- D. Provide temporary electric feeder from existing building electrical service at location as directed.
- E. Complement existing power service capacity and characteristics as required.
- F. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.
- G. Permanent convenience receptacles may be utilized during construction.
- H. With the exception of General Contractor field office, wiring of Contractor's offices, trailers, storage facilities and the like used during construction shall be the responsibility of the individual contractor requiring the same.

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. 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. After building enclosure:
 1. Cost of Energy: By Owner.
- 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.
- F. Owner's existing heat plant may be used.
 1. Exercise measures to conserve energy.
 2. Enclose building prior to activating temporary heat.

1.07 TEMPORARY COOLING

- A. Cost of Energy: By Owner.
- B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.
- C. Maintain maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.
- D. Owner's existing cooling plant may be used.
 1. Exercise measures to conserve energy.
 2. Enclose building prior to activating temporary cooling.
- E. Prior to operation of permanent equipment for temporary cooling 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.

1.08 TEMPORARY VENTILATION

- A. Prior to building enclosure:
 - 1. Each contractor is to provide and pay for temporary ventilation 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 systems for ventilation. The ventilation 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 ventilation using one or both of the following methods.
 - a. Method A: Use of permanent system.
 - 1) Prior to operation of permanent equipment for temporary ventilation 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 ventilation, the HVAC Contractor shall provide temporary controls to maintain the necessary ventilation requirements.
 - 3) Equipment used shall be cleaned and restored to new condition, except for ordinary wear, prior to final acceptance.
 - b. Cost of filters consumed is the responsibility of the General Contractor.
 - c. Method B: Use of Individual Portable Units
 - 1) Provide, maintain, and supervise the operation of temporary portable units. Provide required safety controls.
 - 4. Cost of energy consumed by owner

1.09 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 by owner
- 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.

1.10 TEMPORARY WATER SERVICE

- A. Cost of Water Used: By Owner.
- 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 Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 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).

1.03 PERFORMANCE REQUIREMENTS

- A. 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.
- B. Provide to Owner 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.
- C. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- D. 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.
- E. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
 - 1. Control movement of sediment and soil from temporary stockpiles of soil.
 - 2. Prevent development of ruts due to equipment and vehicular traffic.
 - 3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

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

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. 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.

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. 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.
- C. 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.
- D. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.

- E. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.
- F. 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.
- G. 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.
- H. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

- A. 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.
- B. 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.
- C. 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

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**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. Procedures for Owner-supplied products.
- G. 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
- E. Section 22 05 13 - Common Motor Requirements for Plumbing Equipment: Motors for plumbing equipment.

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. NEMA MG 1 - Motors and Generators 2018.
- C. 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. 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, Andrew Huelsman; ahuelsman@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 Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 5. Agrees to reimburse Owner 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. 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 OWNER-SUPPLIED PRODUCTS

- A. Owner's Responsibilities:
 - 1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
 - 2. Arrange and pay for product delivery to site.
 - 3. On delivery, inspect products jointly with Contractor.
 - 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 - 5. Arrange for manufacturers' warranties, inspections, and service.
- B. Contractor's Responsibilities:
 - 1. Review Owner reviewed shop drawings, product data, and samples.

2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

3.03 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.

3.04 STORAGE AND PROTECTION

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.
- E. Provide off-site storage and protection when site does not permit on-site storage or protection.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- J. Prevent contact with material that may cause corrosion, discoloration, or staining.
- K. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- L. 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: 22094.00 Tipp City Government Center Infill Addition

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

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

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Cutting and patching.
- D. Surveying for laying out the work.
- E. Cleaning and protection.
- F. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- G. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

- A. Section 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 78 00 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
- D. Section 01 79 00 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections
- E. Section 02 41 00 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.
- F. Section 07 84 00 - Firestopping.
- 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 Owner 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 Owner.
- 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 Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

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 the 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 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.

3.04 GENERAL INSTALLATION REQUIREMENTS

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

3.05 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
 - 2. Relocate items indicated on drawings.
 - 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.

4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. Provide temporary connections as required to maintain existing systems in service.
 - c. A minimum of 3 days notice must be given the CM for any planned utility outages. See Section 02 41 00
 4. Verify that abandoned services serve only abandoned facilities.
 5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- D. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
- E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
- F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- G. Refinish existing surfaces as indicated:
- H. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
- I. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- J. Clean existing systems and equipment.
- K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- L. Do not begin new construction in alterations areas before demolition is complete.
- M. Comply with all other applicable requirements of this section.

3.06 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 1. Complete the work.
 2. Fit products together to integrate with other work.

3. Provide openings for penetration of mechanical, electrical, and other services.
 4. Match work that has been cut to adjacent work.
 5. Repair areas adjacent to cuts to required condition.
 6. Repair new work damaged by subsequent work.
 7. Remove samples of installed work for testing when requested.
 8. Remove and replace defective and non-complying work.
- D. Each trade is responsible for cutting and patching for their work unless otherwise noted.
 - E. 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.
 - F. 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.
 - G. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
 - H. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
 - I. Restore work with new products in accordance with requirements of Contract Documents.
 - J. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
 - K. 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.
 - L. 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.
 - M. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - N. 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 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.10 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 Owner prior to final completion before Owner 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.

3.11 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 Owner-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.

3.12 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 Owner.

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 Owner, 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 Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.
- 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 Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Record Drawings: Legibly mark each item to record actual construction including:
 - 1. 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 Owner'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 Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- 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. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
 - 1. Finishes, including flooring, wall finishes, ceiling finishes.
 - 2. 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.
- B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit not less than four weeks prior to start of training.
 - 2. Revise and resubmit until acceptable.
 - 3. Provide an overall schedule showing all training sessions.
 - 4. 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.
- E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner'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 TRAINING - GENERAL

- A. Conduct training on-site unless otherwise indicated.
- B. Owner will provide classroom and seating at no cost to Contractor.
- C. Provide training in minimum two hour segments.
- D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner 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

Division 02

Existing Conditions

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**SECTION 02 41 00
DEMOLITION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of built site elements.
- B. Selective demolition of building elements for alteration purposes.
- C. Abandonment and removal of existing utilities and utility structures.
- D. Salvage of designated building elements.
- E. 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 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 57 13 - Temporary Erosion and Sediment Control.
- D. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- E. 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.
- F. Section 31 10 00 - Site Clearing: Vegetation and existing debris removal.
- G. Section 31 22 00 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.
- H. Section 31 23 23 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.
- I. Section 31 23 23 - Fill: 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.
 - 1. Recyclable Fill: 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 3 inch in each direction.
 - d. Material subject to the approval by representative of the testing agency.

- 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 all other paving and curbs within site boundaries.
- C. Within area of new construction, remove foundation walls and footing in their entirety.
- D. Outside area of new construction, remove foundation walls and footings to a minimum of 2 feet below finished grade.
- E. Remove concrete slabs on grade within site boundaries.
- F. Remove manholes and manhole covers, curb inlets and catch basins.
- G. Remove other items indicated, for salvage, relocation, and recycling.

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 Owner.
- 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 Owner; 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 Owner.
- 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 Owner.
- 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 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 in locations indicated on drawings.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- D. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, Telecommunications, and []): Remove existing systems and equipment as indicated.

1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 3. Verify that abandoned services serve only abandoned facilities before removal.
 4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- F. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
 4. Patch as specified for patching new work.

3.05 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.

3.06 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.

3.07 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 Owner.
- 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 Owner.
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.

3.08 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Recycling, Salvage, and Reuse:
1. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
 2. Recyclable Fill: Concrete and masonry products from on site demolition:
 - a. As specified in Section 31 2323 Fill
 - b. Remove reinforcing and separate to salvaged metals.
 - c. Remove brick and clay masonry.
 - d. Crush concrete and masonry waste to less than 3 inch in each direction.
 - e. Material subject to the approval by representative of the testing agency.
 3. Recyclable Aggregate: Concrete and masonry products from on site demolition:
 - a. As specified in Section 32 1123 Aggregate Base and Surfacing
 - b. Remove reinforcing and separate to salvaged metals.
 - c. Remove brick and clay masonry.
 - d. Crush concrete and masonry waste to less than 1 1/2 inch in each direction.

- e. Material subject to the approval by representative of the testing agency.
- 4. Use of Reclaimed Asphalt Base:
 - a. As specified in Section 32 1123 Aggregate Base and Surfacing
 - b. Material subject to the approval by representative of the testing agency.
- 5. Reclaimed Pavement:
 - a. As specified in Section 32 1216 Asphalt Paving
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

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Division 03

Concrete

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**SECTION 03 15 21
UNDER SLAB VAPOR/TERMITE/GAS BARRIER**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water Vapor and Radon Gas 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 03 35 11 - Concrete Floor Finishes: Densifiers, hardeners, applied coatings, and polishing.
- D. Section 31 23 23 - Fill and Backfill: Aggregate base

1.03 REFERENCE STANDARDS

- A. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.
- B. ACI 302.2R - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials 2006.
- C. 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.
- D. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs 2017.
- E. ACI 302.1R - Guide to Concrete Floor and Slab Construction.
- F. 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

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**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. Miscellaneous concrete elements, including equipment pads.
- H. Concrete Finishing
- I. Concrete curing.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements
- B. Section 03 15 12 - Under Slab Vapor Barrier.
- C. Section 03 35 11 - Concrete Floor Finishes: Densifiers, hardeners, applied coatings, and polishing.
- D. Section 07 92 00 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.
- E. Section 05 50 00 - Metal Fabrications
- F. Section 07 92 00 - Joint Sealers: Sealants for saw cut joints and isolation joints in slabs.
- G. 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. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.
- H. 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.
- F. Shrinking Reducing Admixture:
 1. Admixture not permitted if Moisture Vapor Reduction Admixture is used
 2. Use in gymnasium slab on grade
 3. Application rate should be between 0.5 and 2.0 gallons per cubic yard. The mix design should provide a slab that requires no joints in gymnasium.
 4. Acceptable Manufacturers:
 - a. Eclipse Floor: Grace Construction Products
 - b. Peramin SRA110 and SRA220: Perstorp Polyois Inc.; Toledo, Ohio
 - c. Tetraguard AS20 by Master Builders/Nihon Cement Company
 - d. Axim Italcementi Group
 - e. Promix, www.promixadmix.com
 - f. Substitutions: See Section 01 6000 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 ACI 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	Tr-Fn2	4,000 P.S.I. at 28 days

CONCRETE SCHEDULE ITEM OR STRUCTURE	FINISH	COMPRESSIVE STRENGTH AND OTHER REQUIREMENTS
receive thin-set flooring, resilient flooring and other flooring types, unless otherwise noted		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 concrete not otherwise indicated	NsBrm-Fn Grt-CI-Fn	4,500 P.S.I. at 28 days 4.5% - 7.5% entrainment Maximum W/C Ratio = 0.45
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.
 - 2. Saw cuts are not permitted for the gymnasium slab.

- 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 ADA PAVING UNITS

- A. Set paver units in full mortar bed of minimum 3/4 inch thickness, to support pavers over full bearing surface.
- B. Place half units, special shaped units, and curbs at edges and interruptions. Machine saw partial units.
- C. Maintain tight joints between paves and abutting vertical surfaces and protrusions.

3.08 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 1/4 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.

3.09 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 Cl-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.

3.10 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. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
 - 2. 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.
 - 3. 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.

3.11 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.

3.12 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.

3.13 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

3.14 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 03 35 11
CONCRETE FLOOR FINISHES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface treatments for concrete floors and slabs.
- B. Liquid densifiers and hardeners.
- C. Clear penetrating sealers.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.
- B. Section 03 30 00 - Cast-in-Place Concrete: Curing compounds that also function as sealers.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with concrete floor placement and concrete floor curing.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
- C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 10 years of documented experience producing the specified products.
- B. Polisher Qualifications: Company experienced in performing specified work similar in design, products, and extent to scope of this project; with a record of successful in-service performance; and with sufficient production capability, facilities, and personnel to produce specified work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.07 FIELD CONDITIONS

- A. Do not finish floors until interior heating system is operational.
- B. Maintain ambient temperature of 50 degrees F minimum.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 CONCRETE FLOOR FINISH APPLICATIONS

- A. Liquid Densifier and Hardener:
- B. Penetrating Clear Sealer:
 - 1. Use at following locations: Mechanical, Electrical, Technology, Custodial and Storage Rooms, as indicated on the floor finish plans.

2.02 DENSIFIERS AND HARDENERS

- A. Liquid Densifier and Hardener: Penetrating chemical compound that reacts with concrete, filling the pores, hardening, and dustproofing.
 - 1. Composition: Lithium silicate.
 - a. Products:

- 1) Dayton Superior Corporation; Pentra-Hard: www.daytonsuperior.com.
- 2) Euclid Chemical Company; ULTRASIL LI+: www.euclidchemical.com.
- 3) PROSOCO, Inc; Consolideck LS: www.prosoco.com/consolideck.
- 4) SpecChem, LLC; LithSeal SC: www.specchemllc.com.
- 5) W. R. Meadows, Inc; Liqui-Hard Ultra: www.wrmeadows.com/#sle.
- 6) Substitutions: See Section 01 60 00 - Product Requirements.

2.03 COATINGS

- A. Colored Coating (sealer): Pigmented coating to be selected from manufacturers' standards for finishing concrete floors and slabs.
 1. Type: Water Based Epoxy Coating
 2. Slip Resistance: Silica Sand
 - a. Application: Shower/Locker Rooms
 3. Products:
 - a. Dayton Superior Corporation; Spec Cote WB: www.daytonsuperior.com/#sle.
 - b. HP Spartacote, Inc; []: www.hpspartacote.com/#sle.
 - c. Euclid Chemical: Eucopoxy Tufcoat VOX.
 - d. Sherwin Williams: Armorseal 8100; www.sherwin-williams.com

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL

- A. Apply materials in accordance with manufacturer's instructions.

3.03 CHEMICAL STAIN APPLICATION

- A. Apply chemical stains at the coverage rate recommended by the manufacturer and use application equipment according to the chemical stain manufacturer's printed instructions.
 1. Note the color of the liquid chemical stain will not be the final color produced on the concrete substrate.
- B. Transfer chemical stain to the substrate by brush or spray and immediate scrub into surface.
- C. Rinsing:
 1. After the final coat of chemical stain has remained on the surface for a minimum of four hours or as recommended by manufacturer, neutralize unreacted chemical stain residue and then remove completely prior to sealing.
 2. After neutralization, thoroughly rinse surface with clean water several times to remove soluble salts. While rinsing, lightly abrade surface using a low-speed floor machine to remove residue and weakened surface material.
 3. Runoff may stain the adjacent areas. Collect rinse water by wet vacuuming or absorbing with an inert material.
 - a. All stain residue, runoff liquid, and rinse water must be collected and disposed of according to applicable Federal regulations and governing authorities having jurisdiction.
- D. Apply Densifier/Harder after staining is complete

3.04 DENSIFIERS AND HARDENERS

- A. Surface Preparation:
 1. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.

2. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
 3. Remove any concrete laitance and patch or fix all cracks and damaged areas.
 4. New concrete should be properly cured a minimum of 7 days in accord with ACI 302 by one of the following methods: water, plastic sheeting, or reinforced paper.
 5. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
- B. Mixing: Mix thoroughly prior to each use.
- C. Placement:
1. Apply densifier to point of rejection (by spray, roller, brush or pouring), then scrub the product using a soft bristle broom or mechanical scrubber. Work in this manner until the product begins to thicken, rewet with water and work. Do not allow the product to dry, apply additional product if needed to keep wet while working. Thoroughly rinse and then squeegee or brush off excess material until dry.
 2. On porous or rough surfaces, a second application may be required.
 - a. If a second coat is required, immediately apply it in a similar manner as the first coat. Do not allow the treated surfaces to dry between applications.
- D. The use of a mechanical scrubber will increase the effectiveness of the application. The treated surface will develop a "polished" appearance over time.

3.05 COATING APPLICATION

- A. Surface Preparation:
1. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
 2. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
 3. Floors to be mechanically prepared (i.e. shotblast, sandblast) to result in a Concrete Surface Profile (CSP) of between an International Concrete Repair Institute i.e., shotblast, sandblast, to result in a Concrete Surface Profile (ICRI) CSP #1-2, or the texture of medium grit sandpaper to ensure proper adhesion.
 4. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
- B. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.
- C. Mixing: Mix thoroughly prior to each use.
- D. Placement:
1. Apply in uniform, even applications.
 2. Surface and ambient temperature is recommended and relative humidity to be within manufacturers recommend ranges.
 3. Two coats are required
 - a. First Coat: Pour the mixed material onto the floor to be coated. A squeegee can be used to uniformly spread the epoxy on the surface. Immediately back roll with a 1/4 - 3/8 inch phenolic core roller to even out the surface. Avoid over-rolling or over-working the material.
 - b. Slip Resistant Surface
 - 1) Apply a base coat of Spec Cote WB to be applied and clean dry aggregate (silica sand) broadcast on the tacky base coat to the desired texture finish.
 - 2) After the base coat has cured, broom away any loose aggregate and apply a thin topcoat of Spec Cote WB to encapsulate and seal the aggregate.
 - c. Second coat can be applied when the first coat is completely dry and tack free, but must be applied within 16 hours to achieve adequate adhesion and bond between

- coats to avoid
- d. Before second coat application check for the presence of imperfections such as epoxy blush, air bubbles etc. Correct imperfections prior to application.

3.06 POLISHING CONCRETE FLOORS

- A. Initial Grinding
 1. Use grinding equipment with metal bonded grinding pads.
 2. Begin grinding in one direction using sufficient size grit pad.
 3. Make sequential passes with each pass perpendicular to previous pass using finer grit pad with each pass, up to 150 grit.
 4. Begin grinding in one direction using sufficient size grit pad.
- B. Make sequential passes with each pass perpendicular to previous pass using finer grit pad with each pass, up to 150 grit.
- C. Achieve maximum refinement with each pass before proceeding to finer grit pads.
- D. Apply chemical concrete stain:
 1. Clean concrete surfaces until completely penetrable before receiving the initial application of chemical stain. Test surfaces to receive stain by spotting with water. Water should immediately darken the substrate and be readily absorbed. If water beads and does not penetrate or only penetrates in some areas, perform additional surface preparation and testing.
 2. Scoring: Score decorative jointing in concrete surfaces 1/8 inch deep with diamond blades. Rinse until water is completely clean.
 - a. Score concrete before staining.
- E. Apply liquid densifier undiluted to point of rejection, remove excess liquid, and allow to cure according to manufacturers instructions.
- F. Polishing
 1. Use equipment with resin bonded polishing and burnishing pads.
 2. Begin polishing in one direction starting with 800 grit pad.
 3. Make sequential passes with each pass perpendicular to previous pass using finer grit pad with each pass, up to 3000 grit.
 4. Achieve maximum refinement with each pass before proceeding to finer grit pads.
 5. Auto scrub or vacuum floor using squeegee vacuum attachment after each pass.
 6. Continue polishing until gloss appearance, as measured according to ASTM E 430, matches approved field mock-ups.
 7. Uniformly apply and remove excessive liquid according to manufacturers instructions.
 8. Final Polish: Using burnishing equipment and finest grit burnishing pads, burnish to uniform sheen matching approved mock-up.
- G. Final Polished Concrete Floor Finish:
 1. Aggregate Exposure Class D - Large Aggregate Finish: Remove not more than 1/4 inch of concrete surface by grinding and polishing resulting in majority of exposure displaying large aggregate with no, or small amount of, fine aggregate at random locations
 2. Finished Gloss Level 3 - High Gloss Appearance:
 - a. Procedure: Recommended not less than 4 steps with full refinement of each diamond tool with one application of densifier.
 - b. Gloss Measurement: Determine the specular gloss by incorporating the following:
 - 1) Reflective Clarity Reading: Not less than 65 according to ASTM D5767 prior to the application of sealers.
 - 2) Reflective Sheen Reading: Not less than 35 according to ASTM D523 prior to the application of sealers.

END OF SECTION

Division 04

Masonry

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**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 2023.
- 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 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 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 20 00 - Unit Masonry
- E. Section 05 50 00 - Metal Fabrications: Loose steel lintels.
- F. Section 07 21 13 - Board Insulation: Insulation for cavity spaces.
- G. Section 07 84 00 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
- H. 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
 - b. Wirebond:
 - c. Heckman Building Products Inc.: Product #376: www.heckambuildingprods.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.heckambuildingprods.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 A153/153M, 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) 2-Seal Tie.
 - b. Masonry Reinforcing Corporation of America (Wire Bond): www.wirebond.com.
 - c. Heckmann Building Products, Inc.
 - 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/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 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/#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
- 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.

- D. REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY
1. 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 stacked bonded unit joint corners and intersections with strap anchors 16 inches on center.
- E. REINFORCEMENT AND ANCHORAGE - MASONRY VENEER
1. 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.
- F. REINFORCEMENT AND ANCHORAGES - CAVITY WALL MASONRY
1. 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 openings.
 3. Place continuous joint reinforcement in first and second joint below top of walls.
 4. Lap joint reinforcement ends minimum 6 inches.
 5. 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.
 6. Reinforce stacked bonded unit joint corners and intersections with strap anchors 16 inches on center.
- G. REINFORCEMENT AND ANCHORAGES - MULTIPLE WYTHE UNIT MASONRY
1. 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. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
 6. 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.
 7. Reinforce stacked bonded unit joint corners and intersections with strap anchors 16 inches on center.
- H. CONTROL AND EXPANSION JOINTS
1. Install control and expansion joints
 - a. Where shown on the drawings
 - b. In accordance with the Brick Industry Association (BIA) recommendations.
 - c. In accordance with the National Concrete Masonry Association (NCMA) recommendations.
 2. Do not continue horizontal joint reinforcement through control or expansion joints.
 3. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
 4. Size control joints as indicated on drawings; if not shown, 3/8 inch wide and deep.
 5. 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.
- I. BUILT-IN WORK

1. 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.
 2. Install built-in items plumb, level, and true to line.
 3. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
 - a. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
 4. Fill cores in hollow concrete masonry units with grout 3 course (24 inches) under bearing plates beams posts and similar items, unless otherwise indicated.
 5. Do not build into masonry construction organic materials that are subject to deterioration.
- J. TOLERANCES**
1. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
 2. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
 3. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
 4. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.
- K. SOURCE QUALITY CONTROL**
1. 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.
 - a. Contractor shall perform tests in the presence of, A/E, testing lab representative, and General Contractor.
 - 1) Do not proceed more than 3 veneer courses above flashing without testing, observation, and picture documentation by testing lab representative.
 - b. 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.
 - c. 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.
 - d. Water test shall be re-performed where flashing was repaired.
- L. FIELD QUALITY CONTROL**
1. An independent testing agency will perform field quality control tests, as specified in Section 01 43 00 - Quality Assurance.
 - a. The owner is to engage and compensate the on site testing agency.
- M. PROTECTION**
1. Protect installed units from splashing, stains, mortar, and other damage.
 2. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.
- N. MASONRY WASTE DISPOSAL**
1. Comply with waste Management requirements of Division 01, Construction Waste Management and Disposal

END OF SECTION

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**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 04 20 00 - Unit Masonry
- E. Section 05 50 00 - Metal Fabrications:
- F. Section 07 62 00 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.
- G. Section 07 84 00 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
- H. 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 2022c.
- 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 Masonry Accessories.
- 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 MOCK-UP

- A. See Section 01 43 00 Quality Assurance
- B. Mockups: Build mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials, execution, and aesthetic effect.
 - 1. Build mock-up of typical wall area(s) as shown on Drawings including Movement Control Joints (Sealant Filled) 1'4" (minimum length), Air Barrier, Blocking for Window, Horizontal and Vertical Reinforcing, Shelf Angles and Supports, Bond Beams and Lintels, Brick Ties and Anchors Flashing, End Dams, Weeps and Vents, Cavity Drainage Material (if required), Window Head, Sill and Jamb Details.
 - a. Include a sealant-filled joint at least 16 inches long in each exterior wall mock-up.
 - b. Include lower corner of window opening at upper corner of exterior wall mock-up. Make opening approximately 12 inches wide by 16 inches high.
 - c. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mock-up approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
- C. Locate where directed.
 - 1. Finish face is to be facing south
- D. Obtain Architect's acceptance of visual qualities of the panel before starting of masonry work
- E. Mock-up may not remain as part of the Work.
- F. Retain mock-up during the duration on construction as a standard for judging completed masonry.

1.08 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.

1.09 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. Hohmann and Barnard, Inc; Mighty Flash SA
 - c. Wirebond; Bond N Flash SA
 - 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
- 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 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 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.

3.10 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 43 00 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

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**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 04 20 00 - Unit Masonry
- E. 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 2023.
- 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 IMIAWC (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 20 00
UNIT MASONRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete block.
- B. Split Face Concrete Masonry Units

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 04 05 23 - Masonry Accessories
- E. Section 05 50 00 - Metal Fabrications: Loose steel lintels.
- 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 84 00 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
- I. 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 C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- G. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength 2019.
- H. ASTM C1148 - Standard Test Method for Measuring the Drying Shrinkage of Masonry Mortar 1992a (Reapproved 2014).
- I. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms 2021.
- J. 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 Unit Masonry
- 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.
- F. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.

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 MOCK-UP

- A. See Section 01 43 00 Quality Assurance
- B. Mockups: Build mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials, execution, and aesthetic effect.
 - 1. Build mock-up of typical wall area(s) as shown on Drawings including Movement Control Joints (Sealant Filled) 1'4" (minimum length), Air Barrier, Blocking for Window, Horizontal and Vertical Reinforcing, Shelf Angles and Supports, Bond Beams and Lintels, Brick Ties and Anchors Flashing, End Dams, Weeps and Vents, Cavity Drainage Material (if required), Window Head, Sill and Jamb Details.
 - a. Include a sealant-filled joint at least 16 inches long in each exterior wall mock-up.
 - b. Include lower corner of window opening at upper corner of exterior wall mock-up. Make opening approximately 12 inches wide by 16 inches high.
 - c. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mock-up approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
 - 2. Prior to starting general masonry cleaning, prepare mock-up for cleaning using the same cleaning materials and methods proposed for the Work.
 - 3. Protect accepted mock-ups from the elements with weather-resistant membrane.
 - 4. The construction of the mock-up shall be photographed or videotaped by the masonry contractor to be part of a presentation for groups of trades people as they join the project work force.
- C. Locate where directed.
 - 1. Finish face is to be facing south
- D. Obtain Architect's acceptance of visual qualities of the panel before starting of masonry work
- E. Mock-up may not remain as part of the Work.
- F. Retain mock-up during the duration on construction as a standard for judging completed masonry.

1.08 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.

1.09 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 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 units exposed to the exterior
 - 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.
- C. Split-Faced Texture Unit
 - 1. Split-Faced Block: Full Plane split face with Integral color and waterproofing
 - a. Basis of Design: Match existing manufacturer and color
 - 2. Size: Units with nominal face dimensions of 8 x 16 inches and nominal depths as indicated on the drawings for specific locations.
 - 3. Special Shapes: Provide non-standard blocks configured for corners, lintels, control joint edges, and other detailed conditions.
 - a. Use special 45 degree corner units.
 - 4. Integral Water Repellent: Provide Integral water repellent at all units exposed to the exterior

- a. Water repellent concrete masonry units shall comply with the performance criteria of NCMA TEK 19-7
 - b. Manufacturers:
 - 1) Dry-Block Mortar Admixture; Forrer Industries, a unit of W.R. Grace & Co., Cambridge, MA
 - 2) Rheomix: Master Builders, Inc., Cleveland, Ohio
 - 3) Axim Italcementi Group
 - 4) Krete BGP: Krete Industries, Inc
 - 5) Substitutions: See Section 01600 - Product Requirements.
 - 5. Color: As selected from manufacturer's full line of standard colors.
- D. Units with Integral Water Repellent: Concrete block units as specified in this section with polymeric liquid admixture added to concrete masonry units at the time of manufacture.
- 1. Application: All exterior units exposed to the exterior.
 - 2. Performance of Units with Integral Water Repellent:
 - a. Water repellent concrete masonry units shall comply with the performance criteria of NCMA TEK 19-7
 - b. Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
 - c. Compressive Strength: ASTM C1314; maximum 5 percent decrease.
 - d. Drying Shrinkage: ASTM C1148; maximum 5 percent increase in shrinkage.
 - 3. Use only in combination with mortar that also has integral water repellent admixture.
 - 4. Use water repellent admixtures for masonry units and mortar by a single manufacturer.
 - 5. 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. Axim Italcementi Group
 - d. Krete BGP: Krete Industries, Inc
 - e. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MORTAR AND GROUT MATERIALS

- A. Masonry Mortaring: Refer to Section 04 05 13
- B. Masonry Grouting: Refer to Section 04 05 16

2.03 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. Split Face Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Coursing:
 - a. Nominal 8 high units: One unit and one mortar joint to equal 8 inches
 - b. Nominal 16 high units: One unit and one mortar joint to equal 16 inches
 - c. Nominal 4 high units: One unit and one mortar joint to equal 4 inches
 - 4. 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. Concrete Masonry Units with Integral Water Repellent: Water repellent concrete masonry units shall comply with the performance criteria of NCMA TEK 19-7

1. Water Droplet Test: Lay unit in a horizontal position, apply water droplets. Unit manufactured with an integral water-repellent admixture will be able to support at least three out of the five water droplets for a period of five minutes or more.
 2. Sampling randomly chosen units for each 10,000 units shipped.
- E. 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.
- F. 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.
- G. 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

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Division 05

Metals

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**SECTION 05 12 00
STRUCTURAL STEEL FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural steel framing members.
- B. Base plates, shear stud connectors and expansion joint plates.
- C. Grouting under base plates.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete
- B. Section 05 21 00 - Steel Joist Framing.
- C. Section 05 31 00 - Steel Decking: Support framing for small openings in deck.
- D. Section 05 50 00 - Metal Fabrications: Steel fabrications affecting structural steel work.

1.03 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual 2017.
- B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges 2016.
- C. AISC 360 - Specification for Structural Steel Buildings
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- F. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished 2018.
- G. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.
- H. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021.
- I. ASTM A992/A992M - Standard Specification for Structural Steel Shapes 2020.
- J. 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 2021.
- K. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2017.
- L. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.
- M. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
- N. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections 2014, with Errata (2015).
- O. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.
- P. SSPC-SP 3 - Power Tool Cleaning 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 - 2. Indicate top of steel. Top of steel indications shall be referenced from the ground finished floor (100'-0").

3. Connections not detailed.
4. Indicate cambers and loads.
5. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

1.05 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."
- B. Comply with AISC 303 and 360.
- C. Structural steel members designated as architecturally-exposed structural steel (AESS) to also comply with Section 05 12 13.
- D. Erect structural steel in compliance with the AISC "Specifications and Code of Standard Practice."
 1. OSHA safety practices for steel erection per Federal Register 29 CFR 1926, Subpart R.
- E. Fabricator: Company specializing in performing the work of this section with minimum five years of documented experience.
- F. Erector: Company specializing in performing the work of this section with minimum five years of documented experience.
- G. Design connections not detailed on drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in Ohio.

PART 2 PRODUCTS

2.01 GENERAL

- A. All load bearing structural steel shall be fabricated and produced using only steel made in the United States in accordance with Sections 153.011 and 153.99 of the Ohio Revised Code (ORC).

2.02 MATERIALS

- A. Steel Angles, Channels, and S Shapes: ASTM A 36/A 36M or ASTM A 572 (Fy = 50ksi).
- B. Steel W Shapes: ASTM A 992/A 992M (Fy = 50ksi).
- C. Rolled Steel Structural Shapes: ASTM A 992/A 992M (Fy = 50ksi).
- D. Plates and Bar: ASTM A 36, unless otherwise noted.
- E. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.
- F. Pipe: ASTM A 53/A 53M, Type E or S, Grade B, Finish black and galvanized, as indicated.
- G. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, medium carbon, plain unless otherwise noted.
- H. High Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts and hardened washers as follows:
 1. Quenched and tempered medium-carbon steel bolts, nuts and washers complying with ASTM A 325.
 2. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B 695, Class 50, or hot dip galvanized complying with ASTM A 153.
- I. Quenched and tempered alloy steel bolts, nuts and washers complying with ASTM 490.
- J. Snap-off Direct Tension Indicators: ASTM F 1852, type as required or tension control bolts.
 1. Use for all A325 and A490 bolts
- K. Headed Anchor Rods: ASTM A 307 Grade C, plain.
- L. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- M. Sliding Bearing Plates: Teflon coated.

- N. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C 1107/C 1107M premixed, factory packaged, flowable, mortar grouting compound capable of developing a minimum compressive strength of 9,000 psi at 28 days.
- O. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- P. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.03 FABRICATION

- A. Shop fabricate to greatest extent possible.
- B. Shop Fabrication and Assembly: Fabricate and Assemble structural assemblies in the shop to greatest extent possible. Fabricate items of structural steel in accordance with ASIC Specifications and as indicated on final shop drawings. Provide camber in structural steel members where indicated.
 - 1. Properly mark and match mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
 - 2. Where finishing is required, complete assembly, including welding of units before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings burns and other defects.
- C. Connections: Weld or bolt shop connection, as indicated.
 - 1. Bolt field connections, except where welded connections or other connections are indicated.
 - 2. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.
 - 3. Provide unfinished threaded fasteners for only bolted connections to facilitate erection.
- D. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts."
- E. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that will reproduce true alignment of axes without warp.
- F. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.
 - 1. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.
 - 2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
- G. Develop required camber for members.
- H. Metal Jointing and Finish Quality Levels:
 - 1. Exposed Columns (interior and exterior)
 - a. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
 - b. Welded Joints: Continuously welded and ground smooth and flush.
 - c. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
 - d. Exposed Edges and Corners: Eased to small uniform radius.
 - e. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.

2.04 FINISH

- A. Prepare structural component surfaces in accordance with SSPC-SP 3.

- B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed.
- C. Leave structural steel members un-primed if they will be not be in public view.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

- A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".
- B. Erect structural steel in compliance with the AISC "Specifications and Code of Standard Practice."
 - 1. OSHA safety practices for steel erection per Federal Register 29 CFR 1926, Subpart R.
- C. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
- D. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.
- E. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
 - 1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
 - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
 - 3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Trowel grouted surface smooth, splay neatly to 45 degrees. Finish exposed surfaces, protect installed materials, and allow to cure.
 - 4. For proprietary grout materials, comply with manufacturer's instructions.
- F. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure within specified AISC tolerances.
 - 2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
 - 3. Splice members only where indicated and accepted on shop drawings.
- G. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
 - 1. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
 - 2. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
- H. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance

when permitted.

- I. Touch-Up Painting: Immediately after erection, clean field welds bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

3.03 ERECTION

- A. Erect structural steel in compliance with AISC 303.
- B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".
- D. Do not field cut or alter structural members without approval of Architect.
- E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- F. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.05 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 43 00 Quality Assurance.
- B. Special Inspection:
 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the Authority having Jurisdiction (AHJ) that also require special expertise to ensure compliance with the approved contract documents and the referenced standards.
 2. Special inspections are separate from and independent of tests and inspections conducted by the Owner or Contractor for the purposes of quality assurance and contract administration.
- C. Shop-Bolted Connection: Inspect or test in accordance with AISC specifications.
- D. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:
 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 2. Perform visual inspection of all weld.
- E. Field-Bolted Connections: Inspect in accordance with AISC specifications.
 1. For Direct Tension Indicators, comply with requirements of ASTM F 959. Verify that gaps are less than gaps specified in Table 2.
 2. Test at least 25 percent of bolted connections
- F. Field Welding: Inspect and test during erection of structural steel as follows:
 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

2. Perform visual inspection of all welds.

3.06 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 43 00 - Quality Assurance.

END OF SECTION

**SECTION 05 21 00
STEEL JOIST FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Open web steel joists and shear stud connectors, with bridging, attached seats and anchors.
- B. Loose bearing members, such as plates or angles, and anchor bolts for site placement.
- C. Supplementary framing for roof openings greater than 18 inches.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing: Superstructure framing.
- B. Section 05 31 00 - Steel Decking: Support framing for openings less than 18 inches in decking.
- C. Section 05 50 00 - Metal Fabrications: Non-framing steel fabrications attached to joists.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- B. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished 2018.
- C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.
- D. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2009.
- E. ASTM A 325M - Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric); 2009.
- F. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
- G. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel 2018.
- H. SJI Technical Digest No. 9 - Handling and Erection of Steel Joists and Joist Girders 2008.
- I. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.
- J. SSPC-Paint 25 - Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II; Society for Protective Coatings; 1997 (Ed. 2004).
- K. SSPC-SP 2 - Hand Tool Cleaning 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate standard designations, joist coding, configurations, sizes, spacings, cambers, locations of joists, joist leg extensions, bridging, connections, and attachments.
- C. Submittals required by the State of Ohio bearing the seal of a Profession Engineer.
 - 1. Show joist configurations, sizes, spacing, size and type of connectors, cambers, framed openings, bearing and anchor details, bridging, and bracing.
 - 2. Provide shop drawings stamped or sealed by design engineer.

1.05 QUALITY ASSURANCE

- A. Design connections not detailed on drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in Ohio.
- B. Perform Work, including that for headers and other supplementary framing, in accordance with SJI (SPEC) Standard Specifications Load Tables and SJI Technical Digest No. 9.
- C. Manufacturer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.

- D. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
- E. Erector Qualifications: Company specializing in performing the work of this section with minimum 3 years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Transport, handle, store, and protect products to SJI requirements.

PART 2 PRODUCTS

2.01 REFER TO STRUCTURAL DRAWINGS FOR EXACT MATERIALS, SIZES AND LOCATIONS

2.02 GENERAL

- A. Products with Recycled Content:
 - 1. LEED Submittals: State unit cost, post-consumer and post-industrial content percentages, quantity installed, total material cost, and total recycled content value; attach evidence of contents from either manufacturer or an independent agency.

2.03 MANUFACTURERS

- A. Steel Joists:
 - 1. Canam Group Inc: www.canam-steeljoists.ws
 - 2. CMC Joist: www.cmcjoist.com.
 - 3. Nucor-Vulcraft Group: www.vulcraft.com/#sle.
 - 4. Gooder Hendrickson: www.gooderjoist.com
 - 5. New Millenium Building Systems: www.newmill.com
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 MATERIALS

- A. Steel: Comply with SJI and AISC 'Standard Specifications.'
 - 1. strength used as a basis for the design stresses shall be as follows:
 - a. Chords = 50,000psi
 - b. Webs = 36,000psi or 50,000psi
 - 2. Evidence that the steel furnished meets or exceeds the design yield strength shall be provided, on A/E request, in the form of certified test results.
 - 3. Deduct the area of holes in chords from the area of the chord when calculating the strength of the member.
- B. Open Web Joists: SJI Type K Joists:
 - 1. Provide bottom and top chord extensions as indicated.
 - 2. End bearing to be as follows, except as otherwise noted.
 - a. End bearing of 2-1/2 inches on steel supports.
 - b. End bearing of 4 inches on masonry supports.
 - 3. Finish: Shop primed.
 - 4. Expansion type anchor bolts shall provide a minimum of 5,438 lb working strength in shear and 3,225 lb in pull-out per bolt, in 4,000 psi concrete.
 - 5. Finish: Plain, uncoated.
- C. Shear Stud Connectors: Made from ASTM A108 Grade 1015 bars.
- D. Structural Steel For Supplementary Framing and Joist Leg Extensions: ASTM A 36/A 36M.
 - 1. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's 'Specification ' for type of joint chord size, spacing and span.
- E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

1. Coordinate primer with topcoats and sprayed fire-resistive materials and primers

2.05 FABRICATION

A. General: Fabricate steel joists in accordance with SJI and AISC 'Standard Specifications' and as follows:

1. Shop connections and splices shall be welded with either arc or resistance welding. Shop bolted connections are not acceptable. Field bolted splices are acceptable where shown. Field bolted splices are acceptable where shown on the Drawings.
2. Top and bottom chords shall be of uniform size throughout their full length.

B. Camber joists according to SJI's 'Specifications', unless otherwise noted.

C. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds and methods used in correcting welding work.

D. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's 'Specifications' for type of joint, chord size, spacing and span.

2.06 FINISH

A. Shop prime joists .

1. Do not prime surfaces that will be fireproofed.

B. Prepare surfaces to be finished in accordance with SSPC-SP 2.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.02 ERECTION

A. Erect joists with correct bearing on supports.

B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.

C. Coordinate the placement of anchors for securing loose bearing members furnished as part of the work of this section.

D. After joist alignment and installation of framing, field weld joist seats to steel bearing surfaces.

E. Coordinate placement of anchors in concrete and masonry construction for securing bearing plates and angles.

F. After joist alignment and installation of framing, field weld joist seats to bearing plates and angles.

G. Position and field weld joist chord extensions and wall attachments as detailed.

H. Install supplementary framing for floor and roof openings greater than 12 inches.

I. Do not permit erection of decking until joists are braced, bridged, and secured or until completion of erection and installation of permanent bridging and bracing.

J. Do not field cut or alter structural members without approval of joist manufacturer.

K. After erection, prime welds, damaged shop primer, and surfaces not shop primed .

3.03 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From True Alignment: 1/4 inch.

3.04 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. Special Inspection:
 - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved contract documents and the referenced standards.
 - 2. Special inspections are separate from and independent of tests and inspections conducted by the Owner or Contractor for the purposes of quality assurance and contract administration.
- C. Welded Connections: Visually inspect all field-welded connections.

END OF SECTION

**SECTION 05 31 00
STEEL DECKING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof deck.
- B. Supplementary framing for openings up to and including 18 inches.
- C. Bearing plates and angles.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete topping over metal deck.
- B. Section 03 3000 -Cast-in-place Concrete: Placement of anchors for bearing plates cast in concrete.
- C. Section 04 20 00 - Unit Masonry: Placement of anchors for bearing plates embedded in unit masonry assemblies.
- D. Section 05 12 00 - Structural Steel Framing: Support framing for openings larger than 18 inches and shear stud connectors.
- E. Section 05 21 00 - Steel Joist Framing: Support framing for openings larger than 18 inches and shear stud connectors.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- C. 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.
- D. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2021).
- E. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel 2018.
- F. ICC-ES AC43 - Acceptance Criteria for Steel Deck Roof and Floor Systems 2016.
- G. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks 2007.
- H. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.
- B. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.
- C. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.
- D. Certificates: Certify that metal deck meets the requirements of the SDI Design Manual.

1.05 QUALITY ASSURANCE

- A. Design deck layout, spans, fastening, and joints under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in Ohio.
- B. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Cut plastic wrap to encourage ventilation.
- B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Deck:
 - 1. Canam Steel Corporation: www.canam-steeljoists.ws.
 - 2. Nucor-Vulcraft Group: www.vulcraft.com/#sle.
 - 3. Wheeling Corrugating Co: www.wheelingcorrugating.com.
 - 4. New Millenium Building Systems: www.newmill.com
 - 5. Metal Dek Group : www.metaldek.com
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 STEEL DECK

- A. Roof Deck: Non-composite type, fluted steel sheet:
 - 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
 - a. Structural quality Grade 33 or higher.
 - 2. Structural Properties:
 - a. Span Design: Multiple three (3) spans minimum unless otherwise noted.
 - 3. Minimum Metal Thickness, Excluding Finish: 20 gage unless otherwise noted.
 - 4. Nominal Height: Refer to the Drawings
 - 5. Nominal Height: 1-1/2 inch.
 - 6. Profile: Fluted; SDI WR.
 - 7. Formed Sheet Width: 24 inch.
 - 8. Side Joints: Lapped mechanically fastened.
 - 9. End Joints: Lapped, welded.

2.03 ACCESSORY MATERIALS

- A. Bearing Plates and Angles: ASTM A36/A36M steelunfinished.
- B. Welding Materials: AWS D1.1/D1.1M.
- C. Fasteners: Galvanized hardened steel, self tapping.
- D. Mechanical Fasteners: Steel; hex washer head, self-drilling, self-tapping.
 - 1. Design Requirements for Sidelap Connections: Provide number and type of fasteners that comply with the applicable requirements of SDI (DM) design method for roof deck and floor deck applications and ICC-ES AC43.
- E. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.
- F. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.
- G. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to the deck.

2.04 FABRICATED DECK ACCESSORIES

- A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gage, 0.0299 inch thick sheet steel; of profile and size as indicated; finished same as deck.
- B. Roof Drain Pans: Formed sheet steel, 14 gage, 0.0747 inch minimum thickness, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.

3.02 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
- B. On concrete and masonry surfaces provide minimum 4 inch bearing.
- C. On steel supports provide minimum 3 inch bearing.
- D. Fasten deck to steel support members at ends and intermediate supports at 12 inches on center maximum, parallel with the deck flute and at each transverse flute using welds.
 - 1. Welding: Use fusion welds through weld washers.
 - 2. Install and anchor roof deck units to resist gross uplift loading of 45 lbs per square foot at eave overhang and 30 lbs per square foot for other roof areas.
- E. At mechanically fastened male/female side laps fasten at 24 inches on center maximum.
- F. Drive mechanical sidelap connectors completely through adjacent lapped sheets; positively engage adjacent sheets with minimum three-thread penetration.
- G. Weld deck in accordance with AWS D1.3/D1.3M.
- H. At deck openings from 6 inches to 18 inches in size, provide 2 by 2 by 1/4 inch steel angle reinforcement. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.
- I. Where deck (other than cellular deck electrical raceway) changes direction, install 6 inch minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches on center maximum.
- J. At floor edges, install concrete stops upturned to top surface of slab, to contain wet concrete. Provide stops of sufficient strength to remain stationary without distortion.
- K. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.
- L. Close openings above walls and partitions perpendicular to deck flutes with single row of foam cell closures.
- M. Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.
- N. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

3.03 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000.
- B. Special Inspection:
 - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved contract documents and the referenced standards.
 - 2. Special inspections are separate from and independent of tests and inspections conducted by the Owner or Contractor for the purposes of quality assurance and contract administration.

END OF SECTION

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**SECTION 05 50 00
METAL FABRICATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items including:
 - 1. Loose steel lintels
 - 2. Loose bearing and leveling plates
 - 3. Miscellaneous framing and supports

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.
- C. Section 04 2000 - Unit Masonry: Placement of lintels in masonry.
- D. Section 05 12 00 - Structural Steel Framing: Structural steel column anchor bolts.
- E. Section 05 21 00 - Steel Joist Framing: Structural joist bearing plates, including anchorage.
- F. Section 05 31 00 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.
- G. Section 05 51 00 - Metal Stairs.
- H. Section 06 2000 - Finish Carpentry: Mechanical gate latch
- I. Section 09 91 13 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. 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.
- C. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength 2019, with Editorial Revision (2020).
- D. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
- E. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.
- F. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.
- G. SSPC-SP 2 - Hand Tool Cleaning 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- C. Samples
 - 1. Submit samples as requested by the Architect during the course of construction.

1.05 QUALITY ASSURANCE

- A. The work of this section shall be coordinated with the work of other Sections.
 - 1. Verify the dimensions and work of other trades adjoining items of this Section before fabrication and installation.

- B. Furnish to the pertinent trades items included in this Section that are built into the work of other Sections.
- C. Welding shall be performed by qualified welders and shall conform to the applicable AWS welding code.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver items to be incorporated into the work of other trades in sufficient time to be checked prior to installation
- B. Repair items which have become damaged to the satisfaction of the Architect prior to incorporating them into the work. Replace damaged items if repair cannot be done to the satisfaction of the Architect.

1.07 PROJECT SITE REQUIREMENTS

- A. Field measurements shall be taken at the job site, prior to fabrication of items, to verify or supplement indicated dimensions and to ensure proper fitting of all items.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Angles, Channels, and S Shapes: ASTM A 36/A 36M - ASTM 992 (FY = 50ksi)
- B. Steel W Shapes: ASTM A 992/A 992M (FY = 50ksi).
- C. Rolled Steel Structural Shapes: ASTM A 992/A 992M (FY = 50ksi).
- D. Plates and Bar: ASTM A 36, unless otherwise noted.
- E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
 - 1. Properly mark and match mark materials for field assembly
 - 2. Use connections that maintain structural values of joined pieces
- B. Fabricate items with joints tightly fitted and secured.
 - 1. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise shown.
 - 2. Form bent-metal corners to smallest radius possible without causing grain separation of otherwise impairing work.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- G. Cut, reinforce, drill and tap miscellaneous metal work as required to receive finish hardware, screws, and similar items.

2.03 FABRICATED ITEMS

- A. Lintels: As detailed; prime paint finish unless otherwise noted/scheduled.
 - 1. Fabricate loose structural-steel from steel angles and shapes indicated on the drawings.
 - 2. Weld adjoining members together to form a single unit.
 - 3. Size loose lintels to provide bearing at each side of opening equal to one-twelfth of the clear span, but not less than 8 inches.
 - 4. Galvanize after fabrication for use in exterior walls.
- B. Loose Bearing and Leveling Plates
 - 1. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete. Plates to be free from twist and warps and of required thickness and bearing area. Drill plates for receive anchor bolts and grouting.
 - 2. Galvanize after fabrication for use in exterior walls.
- C. Miscellaneous Framing and Supports
 - 1. Provide steel framing and supports that are not part of the structural steel framework as necessary to complete the Work.
 - 2. Fabricate miscellaneous units to sizes, shapes, profiles indicated and necessary to receive adjacent work or work to be retained by framing and supports. Fabricate from structural steel shapes, plates and steel bars of welded construction. Cut, drill, and tap units to receive hardware, hangers, supports, attachments and similar items

2.04 FINISHES - STEEL

- A. Prime paint steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete, items to be embedded in masonry, and items specified for galvanized finish.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
 - 3. Exception: Galvanized items to be embedded in exterior walls or surfaces
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.

- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions and surfaces not shop primed or galvanized , except surfaces to be in contact with concrete.

END OF SECTION

**SECTION 05 51 00
METAL STAIRS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stairs with concrete treads.
- B. Stairs with metal treads.
- C. Structural steel stair framing and supports.
- D. Handrails and guards.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements
- B. Section 03 30 00 - Cast-in-Place Concrete: Concrete fill in stair pans; mesh reinforcement for landings.
- C. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal anchors in concrete.
- D. Section 04 20 00 - Unit Masonry: Placement of metal fabrications in masonry.
- E. Section 05 50 00 - Metal Fabrications.
- F. Section 05 52 13 - Pipe and Tube Railings: Metal handrails.
- G. Section 09 91 13 - Exterior Painting: Paint finish.
- H. Section 09 91 23 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- C. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2009.
- D. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.
- E. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2021.
- F. 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.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2021).
- H. SSPC-SP 2 - Hand Tool Cleaning 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
- C. Design Data: As required by authorities having jurisdiction.
- D. Delegated Design:
 - 1. Stair details shown on the drawings indicate general installation and connection methods. Complete detail of components for all loads and forces is to be shown on the shop drawings. No changes from sizes and installation methods shown on the construction drawings will be permitted without verification that the design criteria cannot be met and

- with express written consent of the Architect and the Engineer of Record.
2. Professional Engineer Qualifications: A Professional Engineer who is legally qualified to practice in the jurisdiction where the project is located and who is experienced in providing engineering services for steel stairs that are similar to those indicated for this project in material, design, and extent.
 3. Shop drawings must include structural analysis data of all stair framing components and connections to supporting structure in conformance with design loads stated on the Structural Drawings. Shop drawings and analysis must bear the seal of the qualified Engineer responsible for their preparation.

1.05 QUALITY ASSURANCE

- A. Perform design and prepare shop drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in Ohio.

PART 2 PRODUCTS

2.01 METAL STAIRS - GENERAL

- A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
 1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
 2. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.
 3. Dimensions: As indicated on drawings.
 4. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
 5. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
 6. Separate dissimilar metals using paint or permanent tape.
- B. Metal Jointing and Finish Quality Levels:
 1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
 - a. Welded Joints: Continuously welded and ground smooth and flush.
 - b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
 - c. Exposed Edges and Corners: Eased to small uniform radius.
 - d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.
 2. Service: Exposed joints tight with face surfaces aligned; underside of stair not covered by soffit is not considered exposed to view.
 - a. Welded Joints: Welded on back side wherever possible.
 - b. Welds Exposed to View: Ground smooth; not required to be flush.
 - c. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts or screw threads.
 - d. Metal Surfaces to be Painted: Sanded smooth, suitable for satin or matte finish.
- C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.02 METAL STAIRS WITH CONCRETE TREADS

- A. Jointing and Finish Quality Level: Architectural, as defined above.
- B. Risers: Closed.
- C. Treads: Metal pan with field-installed concrete fill.

1. Concrete Depth: 2 inches, minimum.
 2. Tread Pan Material: Steel sheet.
 3. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch minimum.
 4. Pan Anchorage to Stringers: Welded to carrier angles welded to stringers.
 5. Concrete Reinforcement: None.
- D. Risers: Same material and thickness as tread pans.
1. Riser: Perforated as shown on the drawings
 - a. Perforations: 1/2 inch diameter holes on 11/16 inch staggered centers
 2. Riser/Nosing Profile: Sloped riser with rounded nosing of minimum radius.
 3. Nosing Depth: Not more than 1 inch overhang.
 4. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch wide.
 5. Abrasives Nosing
 - a. Manufacturer:
 - 1) American Safety Tread; Product Type 8501 with screw anchors color to be selected
 - 2) Base shall consist of heat treated extruded aluminum alloy 6063-T6.
 - 3) Abrasive filler shall consist of a mixture of aluminum oxide and silicon carbide granules in an epoxy matrix locked into the extruded channels of the base. The abrasive ribs shall project a minimum of 1/16 inch above the extruded channels.
 - 4) Nosings run full length of stair.
 - b. Acceptable Manufacturers
 - 1) Wooster Products Inc.
 - 2) Balco Architectural Products.
- E. Stringers: Rolled steel channels.
1. Stringer Depth: As indicated on drawings.
 2. End Closure: Sheet steel of same thickness as risers welded across ends.
- F. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.
- G. Railings: Steel pipe railings.
- H. Finish: Shop- or factory-prime painted.

2.03 METAL STAIRS WITH METAL TREADS

- A. Jointing and Finish Quality Level: Service, as defined above.
- B. Risers: Closed.
- C. Treads and Landings
1. Manufacturer: Wooster Products Inc. Product Number 105 Ferrogrit bolt to stringers
 2. Acceptable Manufacturers:
 - a. Barry Pattern & Foundry
 - b. Robertson Grating Products
 - c. American Safety Tread
 3. Substitutions: See Section 01 60 00 - Product Requirements
- D. Treads and Landings
1. Manufacturer: McNichols Co., GW125 (1 1/4 inch by 3/16 inch) Painted black steel bar grating with checkered plate nosing
 2. Acceptable Manufacturers:
 - a. Metals, Inc, Cleveland, Ohio
 - b. Brown-Campbell, Bloomfield Hills, MI
 - c. IKG Borden, a Harsco Company,
 3. Substitutions: See Section 01 6000 - Product Requirements
- E. Risers: Steel sheet.

1. Riser Thickness: As required by design; 14 gage, 0.075 inch minimum.
 2. Riser/Nosing Profile: Sloped riser with rounded nosing of minimum radius.
- F. Stringers: Rolled steel channels.
1. Stringer Depth: 12 inches.
 2. End Closure: Sheet steel of same thickness as risers welded across ends.
- G. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.
- H. Railings: Steel pipe railings.
- I. Finish: Shop- or factory-prime painted.

2.04 HANDRAILS AND GUARDS

- A. Wall-Mounted Rails: As specified in Section 05 52 13.
- B. Guards: Pipe railings as specified in Section 05 52 13.

2.05 MATERIALS

- A. Rolled Steel Floor Plate: ASTM A786/A
- B. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011 commercial quality, Type B, or structural quality, Grade 30, unless another grade is required by design loads.
- C. Steel Bars for Grating: ASTM A36.
- D. Galvanized Steel Sheet: ASTM A653, G90 coating, either commercial quality, Type B, or structural quality, Grade 33, unless another grade is required for design loads.
- E. Steel Sections Structural Steel Plates, Shapes and Bars: ASTM A 36/A 36M.
- F. Steel Tubing: ASTM A500/A500M or ASTM A501/A501M structural tubing, round and shapes as indicated.
- G. Concrete Fill: Type specified in Section 03 30 00.

2.06 SHOP FINISHING

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime Painting: Use specified shop- and touch-up primer.
1. Preparation of Steel: In accordance with SSPC-SP 2 Hand Tool Cleaning.
 2. Number of Coats: One.
- D. Galvanizing: Hot-dip galvanize to minimum requirements of ASTM A123/A123M.
1. Touch up abraded areas after fabrication using specified touch-up primer for galvanized surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. When field welding is required, clean and strip primed steel items to bare metal.
- B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.03 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
- F. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- G. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.
- H. Obtain approval prior to site cutting or creating adjustments not scheduled.
- I. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.
- J. Abrasive Nosing:
 - 1. Set nosing in a full bed of construction adhesive to totally seat it into the substrate with no voids.
 - 2. Anchor to substrate with countersunk expansion anchors.

END OF SECTION

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**SECTION 05 52 13
METAL PIPE AND TUBE RAILINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall mounted handrails.
- B. Stair railings and guardrails.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Placement of anchors in concrete.
- B. Section 04 20 00 - Unit Masonry: Placement of anchors in masonry.
- C. Section 05 51 00 - Metal Stairs: Handrails other than those specified in this section.
- D. Section 09 21 16 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.
- E. Section 09 91 23 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube 2016.
- C. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube 2020.
- D. ASTM B483/B483M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Tube and Drawn Pipe for General Purpose Applications 2021.
- E. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings 2021.
- F. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings 2000 (Reapproved 2006).
- G. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.
- H. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data including manufacturer's detailed technical product data installation instructions, dimension of each component, and profiles.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
- D. Samples: Submit two, 12 inch long samples of handrail. Submit two samples of elbow, wall bracket, and end stop.
- E. Submit calculations, test data or certification that the railings will resist the load specified the Ohio Basic Building Code.

1.05 QUALITY ASSURANCE

- A. The work of this section shall be coordinated with the work of other Sections.
 - 1. Verify the dimensions and work of other trades adjoining items of this Section before fabrication and installation.
- B. Furnish to the pertinent trades items included under this section that are to be built into the work of other sections.

- C. Welding shall be performed by qualified welder and shall conform to the applicable AWS welding code.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver items to be incorporated into the work of other trades in sufficient time to be checked prior to installation
- B. Repair items which have become damaged to the satisfaction of the Architect prior to incorporating them into the work. Replace damaged items if repair cannot be done to the satisfaction of the Architect.

1.07 PROJECT SITE REQUIREMENTS

- A. Field measurements shall be taken at the job site, prior to fabrication of items, to verify or supplement indicated dimensions and to ensure proper fitting of all items.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.
- B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E 935.
- C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E 935.
- D. Allow for expansion and contraction of members and building movement without damage to connections or members.
- E. Dimensions: See drawings for configurations and heights.
 - 1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
 - 2. Intermediate Rails: 1-1/2 inches diameter, round.
 - 3. Posts: 1-1/2 inches diameter, round.
- F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.
 - 2. For anchorage to masonry, provide brackets to be embedded in masonry, for bolting anchors.
 - 3. For anchorage to stud walls, provide backing plates, for bolting anchors.
 - 4. Posts: Provide adjustable flanged brackets.
- G. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 ALUMINUM MATERIALS

- A. Extruded Bars and Tubing: ASTM B221, Alloy 6063-T5/T2
- B. Extruded Structural Pipe and Round Tubing: ASTM B429, Alloy 6063-T6
- C. Plate and Sheet: ASTM B209, Alloy 6061-T6
- D. Castings: ASTM B26, Alloy A356.0-T6
- E. Aluminum Pipe: Schedule 40; ASTM B429/B429M, ASTM B241/B241M, or ASTM B483/B483M.
- F. Dimensions: See drawings for configurations and heights.

1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
 2. Posts: 1-1/2 inches diameter, round.
- G. Mounting: Brackets and flanges, . Prepare backing plate for mounting in steel or masonry wall construction.
1. Wall Brackets:
 - a. Bracket: Model 403 Aluminum 3 inch projection from face of wall to center line of railing
 - 1) Application: Mounting to walls
 - b. Bracket: Model 404 Aluminum 2 3/4 inch projection from face of post to center line of railing
 - 1) Application: Mounting to railing post
 - c. Manufacturer:
 - 1) Julius Blum & Company, www.juliusblum.com
 - 2) Acceptable Manufacturers:
 - (a) Poma Corp: www.pomacorp.com.
 - (b) SUpperior Aluminum Products; www.superioraluminum.com
 - (c) Sterling Dula Architectural Products: www.sterlingdula.com.
 - (d) R & B Wagner, Inc: www.rbwagner.com.
 - 3) Substitutions: See Section 01 6000 - Product Requirements.
- H. Straight Splice Connectors: Concealed spigot; cast aluminum.
- I. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.

2.03 STEEL RAILING SYSTEM

- A. Plates: ASTM A36.
- B. Steel Pipe: ASTM A 53/A 53M Type F or S Grade A material, black finish.
- C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- D. Exposed Fasteners: No exposed bolts or screws.
 1. Diameter: 1 1/2 outside diameter, unless note otherwise.
 2. Post and top rails shall be continuous.
 3. Spacing: Post shall not exceed 5'-0" on center and shall be uniformly spaced, unless noted otherwise.
- E. Infill at Picket Railings: Vertical pickets.
 1. Horizontal Spacing: Maximum 4 inches on center.
 2. Material: Solid steel bar.
 3. Shape: Square.
 4. Size: 3/4 inch square.
 5. Top Mounting: Welded to underside of top rail.
 6. Bottom Mounting: Welded to top surface of stringer.
- F. Fittings: Elbows, T-shapes, wall brackets, escutcheons; machined steel.
- G. Mounting: Brackets and flanges, with steel inserts for casting in concrete.
- H. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
- I. Straight Splice Connectors: Steel welding collars.
- J. Galvanizing: In accordance with requirements of ASTM A123/A123M.
 1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic.
- K. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.04 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
 - 1. Welds shall be circumferential welds ground smooth and even to produce a railing that is neat in appearance and structurally sound. After fabrication, the welds and surrounding area shall be cleaned and buffed to blend with the adjacent finish.
 - 2. Rail to post connections shall be coped and fastened by continuous welds.
 - 3. Bends in the railing system shall be shown no distortion of the circular railing shape.
- E. Provide spigots and sleeves to accommodate site assembly and installation. Field splices to be located within 8 inches of railing posts.
- F. Provide anchors and plates required for connecting railings to structure.
- G. Exposed Mechanical Fastenings: Provide flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- H. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- I. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
- J. Interior Components: Continuously seal joined pieces by continuous welds.
- K. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- L. Accurately form components to suit specific project conditions and for proper connection to building structure.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete, embedded in masonry, or placed in partitions with setting templates, for installation as work of other sections.
- C. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Where railing is set in concrete, the post shall be placed in 2 1/2 inch diameter opening with non-shrink, nonmetallic grout. Post shall be placed with the centerline 4 inches from the edge of the concrete.
- D. Anchor railings securely to structure.

- E. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.
- F. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- G. Assemble with spigots and sleeves to accommodate tight joints and secure installation.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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**SECTION 05 53 00
METAL GRATINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed metal floor and stair tread gratings.
- B. Flat surface floor and stair tread plating.
- C. Perimeter closure.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications.
- B. Section 05 51 00 - Metal Stairs: Framing for grating and stair treads.
- C. Section 05 52 13 - Pipe and Tube Railings
- D. Section 09 91 23 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2009.
- D. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates 2015.
- E. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.
- F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel 2015.
- H. NAAMM MBG 531 - Metal Bar Grating Manual 2009.
- I. NAAMM MBG 532 - Heavy Duty Metal Bar Grating Manual 2009.
- J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.
- K. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.
- L. SSPC-SP 2 - Hand Tool Cleaning 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, spacing, details of component supports, openings, perimeter construction details, attachments, fasteners, and tolerances.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Include the design engineer's seal and signature on each sheet of shop drawings.
 - 3. Indicate top of steel. Top of steel indications shall be reference from the ground finished floor (100"-0").

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Design gratings under direct supervision of a licensed Professional Engineer experienced in design of this type of work.

- B. Welding shall be performed by qualified welders and shall conform to the applicable AWS welding code.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. McNichols: www.mcnichols.com
- B. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Design Live (Pedestrian) Load: Uniform load of 100 lb/sq ft minimum; concentrated load of 300 lbs.
- B. Maximum Allowable Deflection Under Live Load: 1/240 of span; size components by single support design.

2.03 MATERIALS

- A. Steel Floor Plate: ASTM A786/A786M; manufacturer's standard pattern.
- B. Steel For Welding or Riveting: ASTM A36/A36M unfinished, of shapes indicated.
- C. Steel Framing: ASTM A36/A36M shapes, unfinished.
- D. Cross Bars: ASTM B211 ASTM B211M solid bars.
- E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.04 ACCESSORIES

- A. Fasteners and Saddle Clips: Galvanized steel:
- B. Perimeter Closure: Of same material as grating.

2.05 FABRICATION

- A. Grating Type: NAAMM MBG 531, Welded Type.
- B. Weld joints of intersecting metal sections.
- C. Fabricate support framing for openings.
- D. Top Surface: Non-slip.
- E. Bearing Bar: 1-1/2 inch by 1/8 inch size, spaced 1-3/16 inches on center.
- F. Cross Bar: 1/4 inch by 1/4 inch size, spaced 4 inches on center.

2.06 FINISHES

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Galvanizing for Steel Hardware: ASTM A153/A153M.
- C. Aluminum: Mill finish.
- D. Non-Slip Surfacing: [_____].

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that opening sizes and dimensional tolerances are acceptable.
- B. Verify that supports are correctly positioned.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions.
- B. Place frames in correct position, plumb and level.

- C. Mechanically cut galvanized finish surfaces. Do not flame cut.
- D. Anchor by welding.
- E. Set perimeter closure flush with top of grating and surrounding construction.
- F. Secure to prevent movement.

3.03 TOLERANCES

- A. Comply with NAAMM MBG 531.

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Division 06

Woods, Plastics and Composites

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**SECTION 06 10 00
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rough opening framing for doors, windows, and roof openings.
- B. Roof-mounted curbs.
- C. Roofing nailers.
- D. Preservative treated wood materials.
- E. Fire retardant treated wood materials.
- F. Miscellaneous framing and sheathing.
- G. Communications and electrical room mounting boards.
- H. Concealed wood blocking, nailers, and supports.
- I. 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 07 62 00 - Sheet Metal Flashing and Trim
- D. Section 07 72 00 - Roof Accessories: Prefabricated roof curbs.

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. ASTM D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing 2010 (Reapproved 2017).
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- I. AWPA U1 - Use Category System: User Specification for Treated Wood 2021.
- J. PS 1 - Structural Plywood 2009 (Revised 2019).
- K. PS 20 - American Softwood Lumber Standard 2021.
- L. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber 2019.
- M. SPIB (GR) - Grading Rules 2014.
- N. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17 2018.
- O. 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.

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. Wall Sheathing: APA PRP-108, Structural I Rated Sheathing, Exterior Exposure Class 1, and as follows:
 - 1. Thickness: As noted on drawings and as required to complete the work.
 - 2. Span Rating: 24/0.
 - 3. 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. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
 3. Anchors: Toggle bolt type for anchorage to hollow masonry.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
 2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Fire Retardant Treatment:
 1. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Do not use treated wood in direct contact with the ground.
 2. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat rough carpentry items as indicated .
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Treatment:
 1. Preservative Pressure Treatment of Lumber Above Grade: AWPA 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: AWPA 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. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- E. Provide the following specific non-structural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Handrails.
 - 4. Grab bars.
 - 5. Towel and bath accessories.
 - 6. Wall-mounted door stops.
 - 7. Chalkboards and marker boards.
 - 8. Wall paneling and trim.
 - 9. Joints of rigid wall coverings that occur between studs.

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 specifically indicated otherwise. Form corners by alternating lapping side members.

3.05 INSTALLATION OF CONSTRUCTION PANELS

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
 - 1. Use plywood or other acceptable structural panels at building corners, for not less than 96 inches, measured horizontally.
 - 2. Provide inlet diagonal bracing at corners.

3. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.

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

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SECTION 06 41 00
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Hardware.
- C. Factory finishing.
- D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 06 2000 - Finish Carpentry

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards 2014, with Errata (2018).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- C. BHMA A156.9 - American National Standard for Cabinet Hardware 2010.
- D. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood 2020.
- E. ANSI A135.4 - Basic Hardboard 2012 (Reaffirmed 2020).
- F. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards 2014, with Errata (2018).
- G. BHMA A156.9 - American National Standard for Cabinet Hardware 2010.
- H. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood 2020.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Casework locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances, clearances required, and utility locations, if any.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.
- F. Finish touch-up kit for each type and color of materials provided.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
- B. Perform work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Custom quality, unless other quality is indicated for specific items.
- C. Perform cabinet construction in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Custom quality, unless other quality is indicated for specific items.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.

1.08 FIELD CONDITIONS

- A. Casework supplier shall be responsible for quantities shown on the drawings.
- B. Casework supplier shall be responsible for making field measurements to insure proper fit of casework items.
- C. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- D. For delivery and installation of casework and equipment, building conditions shall be as follows:
 - 1. Building is secure and weather tight, with windows and doors installed, heat and air conditioning systems functional. Walls and openings are plumb, straight and square.
 - 2. Concrete floors must be level within acceptable trade tolerances. Specifically, the floor
 - 3. Wood or metal blocking (wall grounds) must be installed within partitions prior to delivery of casework and furnishings to allow for immediate installation on delivery.
- E. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. CiF Lab Solutions LP;____: www.cifsolutions.com/#sle..
- B. Institutional Casework Inc;____: www.iciscientific.com/#sle..
- C. Kewaunee Scientific Corp;____: www.kewaunee.com/#sle..
- D. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Single Source Responsibility: Provide and install this work from single fabricator.

2.02 CABINETS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Wood Veneer Faced Cabinet:
 - 1. Exposed Surfaces: HPVA HP-1 Grade A, Ash, plain sliced, random-matched.
 - 2. Semi-Exposed Surfaces: HPVA HP-1 Grade B, Ash, plain sliced, random-matched.
 - 3. Concealed Surfaces: {rs#1} Grade C, Ash, plain sliced, random-matched.
- C. Cabinet Front, Side, Exposed Services and Bottom
 - 1. 3/4 inch hardwood
- D. Door and Drawer Fronts
 - 1. 3/4 inch hardwood with all edges eased
- E. Cabinet back:
 - 1. 1/4 inch hardboard or plywood
- F. Cabinet Base:
 - 1. 3/4 inch thick, 4 inch high hardwood
- G. Drawer Construction:
 - 1. 1/2 inch veneer plywood
- H. Drawer bottom:
 - 1. 1/4 inch hardboard or plywood
- I. Shelves

1. Adjustable Shelf Loading: 50 lbs. per sq. ft.
 - a. Deflection: L/144.
2. 3/4 inch hardwood

2.03 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.
- B. Provide sustainably harvested wood, certified or labeled as specified in Section 01 60 00.
- C. Provide wood harvested within a 500 mile radius of the project site.
- D. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless otherwise noted, provided it is clean and free of contamination; identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc.
- E. Hardwood Edgebanding: Use solid hardwood edgebanding matching species, color, grain, and grade for exposed portions of cabinetry.
- F. Exposed Surfaces: APA A-A Grade, quarter-cut white birch book-matched face veneer, Interior rated adhesives, core of particleboard, medium density fiberboard, or engineered combination, thickness as indicated.
- G. Veneer Faced Plywood Finish: HPVA HP-1; graded in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, core of veneer (wood plies); type of glue recommended for specific application; thickness as required; face veneer as follows:
 1. White birch, book-matched.
- H. Medium Density Fiberboard (MDF): ANSI A208.2; type as specified in AWI/AWMAC Architectural Woodwork Quality Standards Illustrated; composed of wood fibers pressure bonded with moisture resistant adhesive to suit application; sanded faces; thickness as required.
- I. Hardboard: AHA A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth two sides (S2S); use for drawer bottoms, dust panels, and other components indicated on drawings.

2.04 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Fasteners: Size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- D. Concealed Joint Fasteners: Threaded steel.

2.05 HARDWARE

- A. Hardware: BHMA A156.9, types as scheduled for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using multiple holes for pin supports and coordinated self rests. 1/4" diameter, metal pins with satin chrome finish, for nominal 1 inch spacing adjustments.
- C. Drawer and Door Pulls: [stainless steel] [edge pulls], [3 3/4] inches wide..
 1. Product: Amerock, Edge Pulls
 - a. Acceptable Manufacturer/Suppliers
 - 1) Julius Blum Inc, Stanley, NC
 - 2) Hafele, Archdale, NC
 - 3) Substitutions: See Section 01 6000 - Product Requirements.
- D. Catches: Magnetic.
 1. Product: #916, Knape and Vogt, Grand Rapids, MI

- a. Acceptable Manufacturer/Suppliers
 - 1) National Cabinet Lock, Maudlin, SC
 - 2) Hafele, Archdale, NC
 - 3) Hardware Resources, Bossier City, LA
 - 4) Substitutions: See Section 01 6000 - Product Requirements.
- E. Drawer Slides:
 - 1. Type: Extension types as indicated.
 - 2. Static Load Capacity: Commercial grade.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.
 - 5. Features: Provide self closing/stay closed type.
 - 6. Manufacturers:
 - a. Accuride International, Inc; Light-Duty Drawer Slides: www.accuride.com/#sle.
 - b. Grass America Inc; [____]: www.grassusa.com.
 - c. Hettich America, LP; [____]: www.hettich.com/#sle.
 - d. Knappe & Vogt Manufacturing Company; Light-Duty Drawer Slides: www.knappeandvogt.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Hinges: European style concealed self-closing type, steel with polished finish.
 - 1. Manufacturers:
 - a. Grass America Inc; Tiomos Hinge System: www.grassusa.com/#sle.
 - b. Hardware Resources; [____]: www.hardwareresources.com/#sle.
 - c. Hettich America, LP; [____]: www.hettich.com/#sle.
 - d. Blum, Inc; [____]: www.blum.com/#sle.
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Door and Drawer Silencers:
 - 1. Two per drawer and door: Rubber or cloth adhered type

2.06 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:
 - 1. Provide center matched panels at each elevation.
 - 2. Provide sequence matching across each elevation.

2.07 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.
- C. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. Stain: As selected by Architect.
 - b. Sheen: Flat.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.
- C. Verify that job site and the conditions under which the work of this section is to be performed. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable.

3.02 INSTALLATION

- A. Casework, countertops and related materials to be conditioned to average prevailing humidity condition in installation areas prior to start of work.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units and countertops.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- F. Secure cabinets and counter bases to floor using appropriate angles and anchorages.
- G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.
- B. Protect installed casework from subsequent construction operations.

END OF SECTION

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Division 07

Thermal and Moisture Protection

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**SECTION 07 01 50.19
PREPARATION FOR RE-ROOFING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal of existing roofing system in preparation for entire new roofing system.
- B. Removal of existing flashing and counterflashings.
- C. Temporary roofing protection.

1.02 RELATED REQUIREMENTS

- A. Section 07 54 19 - PVC Thermoplastic Single-Ply Roofing
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Replacement of flashing and counterflashings.
- C. Section 07 71 00 - Roof Specialties
- D. Section 07 92 00 - Joint Sealants

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with affected mechanical and electrical work associated with roof penetrations.
- B. Preinstallation Meeting: Convene one week before starting work of this section.
 - 1. Attendees:
 - a. Architect.
 - b. Contractor.
 - c. Owner.
 - d. Installer.
 - 2. Meeting Agenda: Provide agenda to participants prior to meeting in preparation for discussions on the following:
 - a. Removal and installation schedule.
 - b. Necessary preparatory work.
 - c. Protection before, during, and after roofing system installation.
 - d. Removal of existing roofing system.
 - e. Installation of new roofing system.
 - f. Temporary roofing and daily terminations.
- C. Schedule work to coincide with commencement of installation of new roofing system.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.

1.06 FIELD CONDITIONS

- A. Existing Roofing System: Membrane roofing.
- B. Do not remove existing roofing membrane when weather conditions threaten the integrity of building contents or intended continued occupancy.
- C. Maintain continuous temporary protection prior to and during installation of new roofing system.
- D. Owner will occupy building areas directly below re-roofing area.
 - 1. Provide Owner with at least 48 hours written notice of roofing activities that may affect their operations and to allow them to prepare for upcoming activities as necessary.
 - 2. Do not disrupt Owner's operations or activities.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Temporary Roofing Protection Materials:
 - 1. Contractor's responsibility to select appropriate materials for temporary protection of roofing areas as determined necessary for this work.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing roof surface has been cleared of materials being removed from existing roofing system and ready for next phase of work as required.

3.02 PREPARATION

- A. Sweep roof surface clean of loose matter.
- B. Remove loose refuse and dispose of properly off-site.

3.03 MATERIAL REMOVAL

- A. Remove only existing roofing materials that can be replaced with new materials the same day.
- B. Remove metal counter flashings.
- C. Scrape roofing gravel from membrane surface without causing serious damage to membrane felts.
- D. Remove roof mounted mechanical equipment and electrical equipment.
- E. Remove damaged insulation and fasteners, cant strips, blocking.
- F. Repair existing wood deck surface to provide smooth working surface for new roof system.

3.04 PROTECTION

- A. Provide temporary protective sheeting over uncovered deck surfaces.
- B. Turn sheeting up and over parapets and curbing. Retain sheeting in position with temporary fasteners.
- C. Provide for surface drainage from sheeting to existing drainage facilities.
- D. Do not permit traffic over unprotected or repaired deck surface.

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 20 00 - Unit Masonry
- C. Section 05 41 00 - Structural Metal Stud Framing: Board insulation as wall sheathing.
- D. 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 2021.
- F. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2022.
- 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 2022a.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a.
- K. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C 2022.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/

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
- D. Insulation over masonry block with rain screen over: Glass fiber Poly-Iso 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) Dupont STYROFOAM Brand CAVITYMATE Ultra Extruded Polystyrene Foam Insulation
 - 2) Owens Corning, Foamular CW-25 Foam Sealed, www.owenscorning.com
 - 3) 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. Rmax; EXOMAX ci FR Air Barrier
 - c. Ox Engineered Products; ISO RED MAX HD
 - d. Substitutions: See Section 01 60 00 - 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 16
BLANKET INSULATION**

PART 1 GENERAL

1.01 SUMMARY OF WORK

- A. Section includes mineral fiber batt.
- B. Section includes blanket thermal insulation.
- C. Section includes stone fiber batt and blanket acoustical insulation.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry
- B. Section 07 84 00 - Firestopping
- C. Section 07 92 00 - Joint Sealants
- D. Section 09 21 16 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

- A. ASTM C165 - Standard Test Method for Measuring Compressive Properties of Thermal Insulations 2007 (Reapproved 2017).
- B. ASTM C167 - Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations 2018 Edition.
- C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.
- D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).
- E. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation 2014 (Reapproved 2019).
- F. ASTM C655 - Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer pipe Revision 19A (2019).
- G. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- H. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel 2008 (Reapproved 2018).
- I. ASTM C1104/C1104M - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation 2019.
- J. ASTM C1670/C1670M - Standard Specification for Adhered Manufactured Stone Masonry Veneer Units 2021b.
- K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- L. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- M. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C 2022.
- N. ASTM E413 - Classification for Rating Sound Insulation 2022.
- O. ASTM E423 - Standard Test Method for Normal Spectral Emittance at Elevated Temperatures of Nonconducting Specimens 1971 Edition.
- P. ASTM E1050 - Standard Test Method for Impedance and Absorption of Acoustical Materials Using a Tube, Two Microphones and a Digital Frequency Analysis System 2019 Edition.

- Q. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors current edition, including all revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Co-ordination: Co-ordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays.

1.05 SUBMITTALS

- A. Make submittals in accordance with Contract Conditions and Section 01 30 00 - Administrative Requirements
- B. Product Data: Submit product data including manufacturer's literature for insulation materials and accessories, indicating compliance with specified requirements and material characteristics.
 - 1. Submit list on insulation manufacturer's letterhead of materials and accessories to be incorporated into Work.
 - 2. MSDS report.
 - 3. Include product name.
 - 4. Include preparation instructions and recommendations, installation methods, and storage and handling requirements.
 - 5. Include contact information for manufacturer and their representative for this Project.
- C. Insulation Installer Qualifications:
 - 1. Submit letter verifying insulation installer's experience with work similar to work of this Section.
- D. Record Documentation: In accordance with Section 01 78 00 - Closeout Submittals.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Mineral Wool: Basis-of-Design Manufacturer: RockWool™; Acoustical Fire Batts (AFB), (US) 4594 Cayce Drive, Byhalia, MS 38611, Phone: 1-877-823-9790.
 - 1. Approved Manufacturers:
 - a. Johns Manville; MinWool SAFB
 - b. Owens Corning Fiberglass Corporation; Thermafiber SAFB
 - c. Substitutions: See Section 01600 - Product requirements.
- B. Acoustic Fiberglass Sound Attenuation Insulation:
 - 1. Approved Manufacturers:
 - a. CertainTeed/Saint Gobain; Noise Reducer Sound Attenuation Batts; www.certainteed.com
 - b. Johns Manville; www.johnsmanville.com
 - c. Owens Corning Fiberglass Corporation; Sound Attenuation Batt Insulation (SAB) Fiberglass Insulation; www.owenscorning.com
 - d. Substitutions: See Section 01 60 00 - Product Requirements

2.02 PERFORMANCE CRITERIA

- A. Lightweight batt insulation for firestopping insulation to ASTM C612, Type IV
 - 1. Fire performance
 - a. Non-Combustability: To ASTM E136
 - b. Surface Burning Characteristics: To ASTM E84
 - 1) Flame Spread: 0
 - 2) Smoke Developed: 0
 - 2. Compressive strength: 144 psf to ASTM C165 at 10 %.
 - 3. Moisture absorption: 0.04 % to ASTM C1104/C1104M.
 - 4. Thermal Resistance: To ASTM C518.

5. Corrosive resistance: To ASTM C665 , Corrosive to steel - Pass.
 6. Stainless steel stress corrosion: To ASTM C795.
 7. Density: To ASTM C167, 4.5 lb/ft3.
 8. Density: 2 pounds per cubic foot, to ASTM C167.
 9. Recycled Content: 16 percent minimum
- B. Acoustical and fire batt insulation for walls and floors to ASTM C655, Type 1 and ASTM C553.
1. Fire performance:
 - a. Non-combustibility: To ASTM E136 .
 - b. Surface Burning Characteristics: To ASTM E84.
 - 1) Flame spread: 0.
 - 2) Smoke developed: 0.
 - c. Acoustical Performance:
 - 1) Airborne sound transmission loss: To ASTM E90.
 - 2) Rating sound insulation: To ASTM E413.
 - 3) Sound absorption coefficients: To ASTM E423.

Inches Thick	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	NRC
1	.14	.25	.65	.90	1.01	1.01	0.70
1.5	.18	.44	.94	1.04	1.02	1.03	0.85
2	.28	.60	1.09	1.09	1.05	1.07	0.95
3	.52	.96	1.18	1.07	1.05	1.05	1.05
4	.86	1.11	1.20	1.07	1.08	1.07	1.10
 - 4) Impedance and absorption of acoustic materials: To ASTM E1050.
 - d. Air erosion velocity: 1000 ft/min maximum to UL 181.
 - e. Thermal resistance: To ASTM C518.
 - f. Corrosive resistance: To ASTM C665, Corrosive to steel - Pass.
 - g. Stainless steel stress corrosion: To ASTM C795.
 - h. Density: To ASTM C612 , 2.5 lb/ft3.
 - i. Recycled Content: 16 percent minimum
- C. Acoustic Fiberglass Sound Attenuation Batts to ASTM C665; friction fit type, unfaced.
1. Products:
 - a. Walls: Fiberglass Sound Attenuation Batts, Batt shall be full depth of studs and width to match stud spacing

2.03 MATERIALS

- A. Non-combustible, lightweight, semi-rigid stone wool batt insulation to ASTM C665, Type 1.
 1. Size: 16.25 x 48 inches.
 2. Thickness: 3.5 inches.
 3. R value /1 inch at 75 °F: 4.0
 4. Acceptable Material: ROCKWOOL, COMFORTBAT®.
- B. Non-combustible, lightweight, semi-rigid stone wool batt insulation to ASTM C612 that provides fire resistance to ASTM E136.
 1. Size: 24 x 48 inches.
 - a. Thickness: 2 inches.
 2. Acceptable Material: ROCKWOOL, ROXUL SAFE™.
- C. Non-combustible, lightweight, semi-rigid stone wool batt insulation to ASTM C665, Type 1, that provides fire resistance to ASTM E136 and a sound control to ASTM E90 and ASTM E423.
 1. Size: 16 x 48 inches, or size to fit in designed wall as shown on drawings.
 2. Thickness: 3.5 inches, or thickness as shown on drawings.
 3. Sound Control: ROCKWOOL, Safe n Sound

4. Thermal Control: ROCKWOOL, Comfortbatt
- D. Non-combustible, lightweight, fiberglass sound attenuation batt insulation to ASTM C665; friction fit type, unfaced.
 1. Size and thickness to fit in designed wall as shown on drawings - full depth of studs and width to match stud spacing

2.04 ACCESSORIES

- A. Mechanical fasteners in accordance with insulation manufacturer's written recommendations.
- B. Acoustical sealant in accordance with manufacturer's instructions.
- C. Firestopping materials.

2.05 SOURCE QUALITY CONTROL

- A. Ensure insulation components and accessories are supplied or approved in writing by single manufacturer.

PART 3 EXECUTION

3.01 INSTALLERS

- A. Use only installers with minimum of 5 years experience with the work similar to work of this section.

3.02 EXAMINATION

- A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for insulation installation in accordance with manufacturer's written recommendations.
 1. Visually inspect substrate in presence of Consultant.
 2. Ensure surfaces are free of snow, ice, frost, grease and other deleterious materials.
 3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.
 4. Start of insulation installation indicates installer's acceptance of substrate installation conditions.

3.03 INSTALLATION

- A. Install insulation in accordance with manufacturer's written recommendations and guidelines.
- B. Install insulation to maintain continuity of thermal protection to building elements and spaces.
- C. Do not compress insulation to fit into spaces.
- D. Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- E. Keep insulation minimum 3 inches from heat emitting devices such as recessed light fixtures, and minimum 2 inches from sidewalls of chimneys and vents.
- F. Seal joints with acoustical joint sealant.
- G. Do not enclose insulation until before inspection and receipt of Consultant's written approval.

3.04 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with Section 01 4500 - Quality Assurance.

3.05 CLEANING

- A. Progress Cleaning: Perform cleanup as work progresses.
 1. Leave work area clean at end of each day.
- B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment.

3.06 PROTECTION

- A. Store the material to protect against weathering and physical damage, including humidity.
- B. Protect installed products and accessories from damage during construction.
- C. Repair damage to adjacent materials caused by insulation installation.

END OF SECTION

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**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

- A. Section 05 50 00 - Metal Fabrications

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 22 16
ROOF BOARD INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fully Adhered insulation, flat and tapered.
- B. Vapor retarder.
- C. Flashings.

1.02 RELATED SECTIONS

- A. Section 05 31 00 - Steel Decking
- B. Section 06 10 00 - Rough Carpentry: Wood nailers, curbs, and cant strips.
- C. Section 07 54 19 - PVC Thermoplastic Roofing
- D. Section 07 6200 - Sheet Metal Flashing and Trim: Counterflashings, reglets, .
- E. Section 07 72 00 - Roof Accessories

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating the following:
 - 1. Flashing materials
 - 2. Insulation
 - 3. Fasteners
 - 4. Maintenance & repair instructions
- C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, and paver layout.
- D. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.
- B. Fire-Test-Response Characteristics
 - 1. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes of 75 and 450, respectively.
 - 2. Exterior Fire-Test Exposure: Class A.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- D. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years experience and approved by manufacturer.
 - 1. The installer shall have an experienced, pre-qualified, thoroughly trained superintendent having experience installing the roof system specified, who is familiar with the requirements of this project, on the job at all times when roofing system work is in progress.

1.05 PRE-INSTALLATION MEETING

- A. Convene one week before starting work of this section.
- B. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.06 WARRANTY

- A. See Section 01 7800 - 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

1.07 PRODUCT DELIVERY, STORAGE AND HANDLING PROCEDURES

- A. Deliver materials in original unopened packaging.
- B. Containers labeled with manufacturer's name, brand name, and identification of various items.
- C. Store materials in a dry area and protect from inclement weather. Damaged materials shall be replaced at contractor's expense.
- D. Do not allow roofing membrane to come in contact or be exposed to any materials that would be detrimental to or cause degradation of the roofing membrane.

PART 2 PRODUCT

2.01 INSULATION MANUFACTURERS

- A. Insulation:
 - 1. Atlas Roofing Corporation: www.atlasroofing.com.
 - 2. GAF Materials Corporation: www.gaf.com.
 - 3. Apache Products Co: www.apacheproducts.com.
 - 4. Dow Chemical Co: www.dow.com.
 - 5. Owens Corning Corp: www.owenscorning.com.
 - 6. Hunter: www.hunterpanels.com
 - 7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 INSULATION

- A. Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C 1289, Type II, Class 1, cellulose felt or glass fiber mat both faces; Grade 2 and with the following characteristics:
 - 1. Facing: Asphalt felt or mat both faces.
 - 2. Board Size: 48 x 96 inch.
 - 3. Board Thickness: 2 1/2 inch.
 - 4. Board Edges: Square.
 - 5. Insulation must be compatible with roof membrane.
 - 6. Manufacturers:
 - a. Atlas Roofing Corporation: www.atlasroofing.com.
 - b. Apache Products Co: www.apacheproducts.com.
 - c. GAF Materials Corporation: www.gaf.com.
 - d. Hunter Panels; www.hpanels.com
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- B. Tapered Polyisocyanurate Board Insulation: Rigid cellular foam, complying with ASTM C 1289, Type II, Class 1, cellulose felt or glass fiber mat both faces; Grade 1 and with the following characteristics:
 - 1. Compressive Strength: 16 psi
 - 2. Facing: Asphalt felt or mat both faces.

3. Board Size: 48 x 96 inch.
 4. First layer; Board Thickness: 2 inch.
 5. Second layer; Tapered Board: Slope 1/4 inch per foot; minimum thickness 1/2 in; fabricate of fewest layers possible.
 6. Thermal Resistance: R-value of 7 per inch thickness.
 7. Board Edges: Square.
 8. Insulation must be compatible with roof membrane.
 9. Manufacturers:
 - a. Atlas Roofing Corporation: www.atlasroofing.com.
 - b. Apache Products Co: www.apacheproducts.com.
 - c. GAF Materials Corporation: www.gaf.com.
 - d. Hunter Panels; www.hpanels.com
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- C. Tapered Crickets (where required)
1. Crickets shall be formed of tapered material having the same requirements and characteristics as insulation specified.

2.03 ACCESSORIES

- A. Adhesive
1. Fully adheared roofing system. Refer to manufacturer for approved adhesive to be used to hold insulation system together.
- B. Nailers & Blocking
1. Nailers and wood blocking shall be S4S 1500 fc construction grade Douglas fir conforming to standard 15 grading and dressing rules of the West Coast Lumber Inspection Bureau, or other species of wood of equal strength. All lumber shall be grade marked at the mill.
 2. All lumber shall be pressure treated by a method approved by the roofing membrane manufacturer.
 3. Nailers shall be securely anchored to the deck to resist the minimum force required in Loss Prevention Data Sheet I-49, "Perimeter Flashing," Factory Mutual Systems. The thickness of the nailer shall be such that the top of the nailer is flush with the surface to which the membrane is to be applied.
- C. Membrane adhesive: as recommended by membrane manufacturer.
- D. Vapor Retarder:
1. ASTM C1136
 2. Maximum permeance rating of 0.13 perm.
 3. Manufacturers:
 - a. Griffolyn Type-65; Reef Industries, Houston, Texas
 - b. DURA-SKRIM 6WW; Raven Industries, Sioux Falls, South Dakota
 - c. WMP-VR; Lamtec Corporation, Mount Bethel, Pennsylvania
 - d. Or as recomended by roofing membrane manufacturer

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect all surfaces to receive roofing for any condition that will adversely affect execution, performance, or quality of work.
- B. Verify that surfaces and site conditions are ready to receive work.
- C. Verify deck is supported and secure.
- D. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- E. Verify deck surfaces are dry and free of snow or ice.

- F. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.
- G. All roof surfaces and all sloped surfaces to drains and outlets shall be checked and approved by the roofing contractor prior to the start of the roofing work.
- H. Install roofing material only under satisfactory conditions as specified by the membrane manufacturer.

3.02 GENERAL REQUIREMENTS

- A. Do not lay out or expose any insulation on the deck that cannot be covered by membrane on the same day.
- B. In making all field heat welds, make sure all edges are clean and free of tar, mastic or other foreign items.
- C. Do not expose membrane and accessories to a constant temperature in excess of 110 degrees Fahrenheit.
- D. Sealants and adhesives should be applied according to the manufacturer's specifications and all containers shall be disposed of properly.
- E. Start securing the membrane at the highest point and work towards the drains.
- F. Weather precautions: Proceed with roofing work when existing and forecasted weather conditions permit work performance in compliance with manufacturer's recommendations.
- G. Roofing system shall not be applied when the surrounding air, surface temperature, relative humidity or wind velocity is not within the range acceptable under the manufacturer's recommendations.
- H. Prior to starting work, protect all work in an approved manner including all paving and faces of building walls. Provide special protection of the face of the building wall adjacent to hoist.

3.03 METAL DECK PREPARATION

- A. Install preformed sound absorbing glass fiber insulation strips supplied by Section 05 31 00 in acoustic deck flutes. Install in accordance with manufacturer's instructions.

3.04 INSTALLATION OF VAPOR BARRIER

- A. Install Vapor Retarder
 1. At acoustical metal deck, install acoustical insulation in roof deck flutes first.
 2. Loosely lay vapor retarder over entire roof area extending to roof edges and to adjacent walls
 3. Side and end laps of each sheet a minimum of 6 inches
 4. Seal laps with continuous strip of tape recommended by the vapor retarder manufacturer. Seal at penetrations and at roof edges with manufacturer recommended butyl tape or sealant
 5. Vapor retarder shall be positively sealed at all edges, penetrations and wall utilizing manufacturers' vapor retarder accessories
 6. Seal at penetrations and at roof edges with manufacturer recommended butyl tape or sealant

3.05 INSULATION INSTALLATION

- A. Attachment of Insulation:
 1. Loose lay both layers of insulation over vapor retarder in accordance with insulation manufacturer's instructions. Mechanically fasten coverboard, over insulation layers, to metal deck in accordance with manufacturer's instructions.
- B. On metal deck, place boards perpendicular to flutes with insulation board edges bearing on deck flutes.
- C. The ends of the insulation boards shall be staggered 50% from row to row.

- D. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- E. Lay subsequent layers of insulation with joints staggered minimum 12 inch from joints of preceding layer.
- F. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.
- G. Tape joints of insulation in accordance with insulation manufacturer's instructions.
- H. Do not apply more insulation than can be covered with membrane in same day.

3.06 CLEAN-UP

- A. Upon completion of the membrane installation, the contractor shall remove all foreign matter, rubbish and scrap material from the roof. The membrane surface shall be cleaned using cleaners recommended by the membrane manufacturer.
- B. Repair or replace defaced or damaged finishes caused by work of this section.

3.07 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field quality control and inspection.
- B. Inspection: Roofing manufacturer's technical representative and roofing contractor shall conduct all required inspections. Submit all required drawings, details, and completed questionnaires to the roofing manufacturer before obtaining the specified warranty. After an authorized Technical Representative has inspected the roof for determining acceptability for warranty issuance, any deficiencies on the final inspection report shall be corrected by the contractor/applicator and made ready for reinspection within five (5) working days.
- C. Warranty: Upon receipt of required materials, certifying inspection, and acceptance of the roofing system by the roofing manufacturer, the warranty shall be duly executed and issued to the Owner. Date of Warranty will be the date of Substantial Completion.

3.08 PROTECTION OF FINISHED WORK

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

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**SECTION 07 24 00
EXTERIOR INSULATION AND FINISH SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Composite wall and soffit cladding of rigid insulation and reinforced finish coating ("Class PB").
- B. Drainage and water-resistive barriers behind insulation board.

1.02 RELATED REQUIREMENTS

- A. Section 05 41 00 - Structural Metal Stud Framing: Sheathing on metal studs.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Perimeter flashings.
- C. Section 07 92 00 - Joint Sealants: Sealing joints between EIFS and adjacent construction and penetrations through EIFS.

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. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus 2011.
- C. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2019.
- D. ASTM C1397 - Standard Practice for Application of Class PB Exterior Insulation and Finish Systems (EIFS) and EIFS with Drainage 2013.
- E. ASTM D968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive 2005 (Reapproved 2010).
- F. ASTM D2247 - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity 2011.
- G. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2012.
- H. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2016).
- I. ASTM E1677 - Standard Specification for an Air Barrier (AB) Material or System for Low-Rise Framed Building Walls 2011.
- J. ASTM E2273 - Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies 2003 (reapproved 2011).
- K. ASTM E2486/E2486M - Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS) 2013.
- L. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials 2013.
- M. ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials 2013.
- N. ICC-ES AC219 - Acceptance Criteria for Exterior Insulation and Finish Systems 2009, with Editorial Revision (2014).
- O. ICC-ES AC235 - Acceptance Criteria for EIFS Clad Drainage Wall Assemblies 2009, with Editorial Revision (2012).
- P. NFPA 259 - Standard Test Method for Potential Heat of Building Materials 2013.
- Q. NFPA 268 - Standard Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source 2012.

- R. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components 2012.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate wall and soffit joint patterns, joint details, and molding profiles.
- C. Product Data: Provide data on system materials, product characteristics, performance criteria, and system limitations.
- D. Verification Samples: Submit actual samples of selected coating on specified substrate, minimum 12 inches square, illustrating project colors and textures.
- E. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, and jointing requirements.

1.05 QUALITY ASSURANCE

- A. Maintain copy of specified installation standard and manufacturer's installation instructions at project site during installation.
- B. EIFS Manufacturer Qualifications: Provide EIFS products other than insulation from the same manufacturer with qualifications as follows:
 - 1. Member in good standing of EIMA (EIFS Industry Members Association).
 - 2. Manufacturer of EIFS products for not less than 5 years.
- C. Insulation Manufacturer Qualifications: Approved by manufacturer of EIFS and approved and labeled under third party quality program as required by applicable building code.
- D. Installer Qualifications: Company specializing in the type of work specified and with at least three years of documented experience.

1.06 MOCK-UP

- A. Construct mock-up of typical EIFS application on specified substrate, size as required to include examples of all key conditions, and including flashings, joints, and edge conditions.
- B. Locate mock-up as indicated on drawings.
 - 1. Finish face is to be facing south
- C. Obtain Architect's acceptance of visual qualities of the panel before starting of masonry work
- D. Mock-up may remain as part of the Work.
- E. Retain mock-up during the duration on construction as a standard for judging completed work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to project site in manufacturer's original, unopened containers with labels intact. Inspect materials and notify manufacturer of any discrepancies.
- B. Storage: Store materials as directed by manufacturer's written instructions.

1.08 FIELD CONDITIONS

- A. Do not prepare materials or apply EIFS under conditions other than those described in the manufacturer's written instructions.
- B. Do not prepare materials or apply EIFS during inclement weather unless areas of installation are protected. Protect installed EIFS areas from inclement weather until dry.
- C. Do not install coatings or sealants when ambient temperature is below 40 degrees F.
- D. Do not leave installed insulation board exposed to sunlight for extended periods of time.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's standard material warranty, covering a period of not less than 5 years.

- C. Provide separate warranty from installer covering labor for repairs or replacement for a period of not less than 2 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design:
 - 1. Dryvit Systems, Inc; Dryvit Outsulation EIFS, Class PB: www.dryvit.com/
- B. Other Acceptable Manufacturers:
 - 1. Parex USA, Inc; Parex Standard WaterMaster EIFS: www.parex.com.
 - 2. BASF Wall Systems (Senergy, Finestone, Acrocrete, SonoWall): www.wallsystems.basf.com.
 - 3. Sto Corp; []: www.stocorp.com.

2.02 EXTERIOR INSULATION AND FINISH SYSTEM

- A. Exterior Insulation and Finish System: DRAINAGE type; reinforced finish coating on mechanically-fastened insulation board over sheet-type combination drainage layer/water-resistive barrier over substrate; provide a complete system that has been tested to show compliance with the following characteristics; include all components of specified system and substrate(s) in tested samples.
- B. Fire Characteristics:
 - 1. Flammability: Pass, when tested in accordance with NFPA 285.
 - 2. Ignitibility: No sustained flaming when tested in accordance with NFPA 268.
 - 3. Potential Heat of Foam Plastic Insulation Tested Independently of Assembly: No portion of the assembly having potential heat that exceeds that of the insulation sample tested for flammability (above), when tested in accordance with NFPA 259 with results expressed in Btu per square foot.
- C. Water Penetration Resistance: No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes, when tested in accordance with ASTM E331 at 6.24 psf differential pressure with tracer dye in the water spray; include in tested sample at least two vertical joints and one horizontal joint of same type to be used in construction; disassemble sample if necessary to determine extent of water penetration.
- D. Drainage Efficiency: Average minimum efficiency of 90 percent, when tested in accordance with ASTM E2273 for 75 minutes.
- E. Salt Spray Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 300 hours exposure in accordance with ASTM B117, using at least three samples matching intended assembly, at least 4 by 6 inches in size.
- F. Freeze-Thaw Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 10 cycles, when tested in accordance with ICC-ES AC219 or ICC-ES AC235.
- G. Weathering Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 2000 hours of accelerated weathering conducted in accordance with ASTM G153 Cycle 1 or ASTM G155 Cycles 1, 5, or 9.
- H. Water Degradation Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 14 days exposure, when tested in accordance with ASTM D2247.
- I. Mildew Resistance: No growth supported on finish coating during 28 day exposure period, when tested in accordance with ASTM D3273.
- J. Abrasion Resistance Of Finish: No cracking, checking or loss of film integrity when tested in accordance with ASTM D968 with 113.5 gallons of sand.

- K. Impact Resistance: Construct system to provide the following impact resistance without exposure of broken reinforcing mesh, when tested in accordance with ASTM E2486/E2486M:
 - 1. Standard: 25 to 49 in-lb, for areas not indicated as requiring higher impact resistance.
 - 2. Medium: 50 to 89 in-lb, for areas indicated on drawings.

2.03 MATERIALS

- A. Finish Coating Top Coat: Water-based, air curing, polymer-based finish with integral color and texture.
 - 1. Texture: Match existing building EIFS system color and texture..
 - 2. Color to match that of the existing building.
- B. Base Coat: Fiber-reinforced, acrylic or polymer-based product compatible with insulation board and reinforcing mesh.
- C. Reinforcing Mesh: Balanced, open weave glass fiber fabric, treated for compatibility and improved bond with coating, weight, strength, and number of layers as required to meet required system impact rating.
- D. Insulation Board: Molded expanded polystyrene (EPS) board insulation, ASTM C578, Type XI, with the following characteristics:
 - 1. Grooved Board: Back side of board adjacent to sheathing grooved with vertical channels designed to allow moisture to drain; at drainage points provide board configuration that permits drainage to the exterior.
 - 2. Board Thickness: As indicated on drawings.
 - 3. Thickness Tolerance: plus/minus 1/16 inch maximum.
 - 4. Thermal Resistance (R factor per 1 inch (25.4 mm)) at 75 degrees F: 4.00.
- E. Combination Drainage Layer/Water-Resistive Barrier: Air- and water-resistive sheet complying with ASTM E1677 Type I, dimpled or otherwise profiled to maintain air and drainage space between insulation board and sheathing; minimum water vapor permeance of 20 perms; furnished or approved by EIFS manufacturer.

2.04 ACCESSORY MATERIALS

- A. Insulation Adhesive: Type required by EIFS manufacturer for project substrate.
- B. Insulation Fasteners: Fastener and plate system appropriate for substrate and as recommended by EIFS manufacturer.
- C. Trim: EIFS manufacturer's standard PVC or galvanized steel trim accessories, as required for a complete project and including starter track and drainage accessories.
- D. Sealant Materials: Compatible with EIFS materials and as recommended by EIFS manufacturer.
- E. Exterior Soffit Vents: One piece, perforated, ASTM A653/A653M galvanized steel with G90 coating, with edge suitable for direct application to gypsum board and manufactured especially for soffit application. Provide continuous vent.

PART 3 EXECUTION

3.01 GENERAL

- A. Install in accordance with EIFS manufacturer's instructions and ASTM C1397.
- B. Where different requirements appear in either document, comply with the most stringent.
- C. Neither of these documents supercedes the provisions of the Contract Documents that define the contractual relationships between the parties or the scope of work.

3.02 EXAMINATION

- A. Verify that substrate is sound and free of oil, dirt, other surface contaminants, efflorescence, loose materials, or protrusions that could interfere with EIFS installation and is of a type and construction that is acceptable to EIFS manufacturer. Do not begin work until substrate and

adjacent materials are complete and thoroughly dry.

- B. If paper-faced gypsum sheathing has been exposed to weather for more than 30 days, check for integrity of surface using method specified in ASTM C1397 Annex A2, at minimum of two locations or once every 5000 sq ft, whichever is greater; if any test fails, notify Architect and do not begin installation.
- C. Verify that substrate surface is flat, with no deviation greater than 1/4 in when tested with a 10 ft straightedge.

3.03 INSTALLATION - GENERAL

- A. Install in accordance with EIFS manufacturer's instructions and ASTM C1397.
 - 1. Where different requirements appear in either document, comply with the most stringent.
 - 2. Neither of these documents supercedes provisions of Contract Documents that defines contractual relationships between parties or scope of this work.

3.04 INSTALLATION - WATER-RESISTIVE BARRIER

- A. Mechanically attach sheet materials to substrate using fasteners and fastener spacing recommended by EIFS manufacturer.
- B. Seal substrate transitions and intersections with other materials to form continuous water-resistive barrier on exterior of sheathing, using method recommended by manufacturer.
- C. At door and window rough openings and other wall penetrations, seal water-resistive barrier and flexible flashings to rough opening before installation of metal flashings, sills, or frames, using method recommended by manufacturer.
- D. At moving expansion joints, apply flexible flashing or flashing tape across and recessed into joint with U-loop forming continuous barrier but allowing movement.
- E. Lap flexible flashing or flashing tape at least 2 inches on each side of joint or transition.
- F. Install drainage layer or spacers after flashing tape has been completed.
- G. Exterior Soffit Vents: Install according to manufacturer's written instructions and in locations indicated on drawings. Provide vent area specified.

3.05 INSTALLATION - INSULATION

- A. Install in accordance with manufacturer's instructions.
- B. Prior to installation of boards, install starter track and other trim level and plumb and securely fastened. Install only in full lengths, to minimize moisture intrusion; cut horizontal trim tight to vertical trim.
- C. Install back wrap reinforcing mesh at all openings and terminations that are not to be protected with trim.
- D. On wall surfaces, install boards horizontally. On horizontal surfaces, install boards [_____].
- E. Place boards in a method to maximize tight joints. Stagger vertical joints and interlock at corners. Butt edges and ends tight to adjacent board and to protrusions. Achieve a continuous flush insulation surface, with no gaps in excess of 1/16 inch.
- F. Fill gaps greater than 1/16 inch with strips or shims cut from the same insulation material.
- G. Rasp irregularities off surface of installed insulation board.
- H. Mechanical Fastening: Space fasteners as recommended by EIFS manufacturer.

3.06 INSTALLATION - CLASS PB FINISH

- A. Base Coat: Apply in thickness as necessary to fully embed reinforcing mesh, wrinkle free, including back-wrap at terminations of EIFS. Install reinforcing fabric as recommended by EIFS manufacturer.
 - 1. Lap reinforcing mesh edges and ends a minimum of 2-1/2 inches.
 - 2. Allow base coat to dry a minimum of 24 hours before next coating application.

- B. Apply finish coat after base coat has dried not less than 24 hours, embed finish aggregate, and finish to a uniform texture and color.
- C. Seal control and expansion joints within the field of exterior finish and insulation system, using procedures recommended by sealant and finish system manufacturers.

3.07 CLEANING

- A. Clean EIFS surfaces and work areas of foreign materials resulting from EIFS operations.

3.08 PROTECTION

- A. Protect completed work from damage and soiling by subsequent work.

END OF SECTION

**SECTION 07 42 13.13
FORMED METAL WALL PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured metal panels for exterior wall panels and subgirt framing assembly, with related flashings and accessory components.
- B. Sub Framing

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements
- B. Section 04 20 00 - Unit Masonry: Wall panel substrate
- C. Section 07 21 13 - Board Insulation.
- D. Section 07 21 99 - Foam in Place Insulation
- E. Section 07 92 00 - Joint Sealants: Sealing joints between metal wall panel system 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 B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate dimensions, layout, joints, construction details, and methods of anchorage.
- C. Shop Drawing: Sub framing system: Indicate dimensions, layout, construction details, method of anchorage
- D. Samples: Submit two samples of wall panel and soffit panel, 12 inch by 12 inch in size illustrating finish color, sheen, and texture.
- E. Manufacturer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Manufacturer's Qualifications: Wall system manufacturer has been engaged in the fabrication of metal wall systems for at least ten years.
 - 1. The Manufacturer shall be a member of the Metal Building Manufacturer's Association (MBNA).
 - 2. The American Institute of Steel Construction (AISC) currently certifies the Manufacturer for Category MB.
 - 3. The Manufacturer maintains a certified installer program for its products and maintains an up to date authorized roofing contractor list.
 - 4. The Manufacturer has a written warranty covering durability, color and weather tightness of its roof system.
 - 5. Manufacturer shall produce the metal panels on fixed equipment operated by the manufacturer.
- C. Installer Qualifications: Company specializing in performing sheet metal installations with minimum 5 years of experience on projects of similar size and scope.

1. Contractor shall follow the Manufacturer's installation details without exception unless written authorization from the manufacturer and architect are provided on an installation detail revision.

1.06 MOCK-UP

- A. See Section 01 40 00 Quality Requirements
- B. Mockups: Build mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials, execution, and aesthetic effect.
- C. The construction of the mock-up shall be photographed or videotaped by the masonry contractor to be part of a presentation for groups of trades people as they join the project work force.
- D. Locate where directed by Architect.
 1. Finish face is to be facing south
- E. Obtain Architect's acceptance of visual qualities of the mock up before starting of panel work
- F. Mock-up may not remain as part of the Work.

1.07 PRE-INSTALLATION MEETING

- A. Convene two weeks before starting work of this section.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver system components to the project site in Manufacturer's unopened original containers.
- B. Protect system components during shipment, storage, handling and erection from mechanical abuse, stains, discoloration and corrosion.
- C. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- D. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.
- E. Prevent contact with materials that may cause discoloration or staining of products.
- F. Damaged materials will be rejected and removed from the site.

1.09 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. Standard Manufacturer Warranty: Provide a written warranty, with monetary limitation, signed by manufacturer agreeing to promptly repair leaks resulting from defects in materials or workmanship for the following warranty period:
 1. Warranty Period: 20 Years from the date of Substantial Completion
- D. Finish Warranty: Furnish panel manufacturer's written warranty for twenty (20) years covering the finish of exposed coated metal surfaces against blistering, peeling, cracking, flaking, checking, chipping, rusting, and chalking and color change during the warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: HWP Panel, manufactured by Dimensional Metals.
 1. Product: HWP Wall Panel, vertical installation.
- B. Basis of Design: Flush Panel manufactured by Dimensional Metals.
 1. Product: Flush Panel FP1012

- C. Other Acceptable Manufacturers:
 1. Architectural Metal Systems, Alpharetta Ga
 2. Berridge Manufacturing, Houston Tx
 3. Centria.
 4. McElroy Metal, Inc. Bossier City La
 5. MBCI.
 6. Petersen, Pac-Clad

2.02 MANUFACTURED METAL PANELS

- A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
 1. Provide exterior wall panels, soffit panels, and subgirt framing assembly.
 2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
 3. Design Pressure: In accordance with applicable codes.
 4. Maximum Allowable Deflection of Panel: $L/180$ for length(L) of span.
 5. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
 6. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
 7. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
 8. Corners: Factory-fabricated in one continuous piece with minimum 2 inch returns.
- B. Flush Wall Panel (FP):
 1. Profile: Vertical; style as indicated.
 - a. 12 inch wide panel, 1 inch deep,
 2. Side Seams: Double-interlocked, tight-fitting, sealed with continuous gaskets.
 3. Material: Precoated steel sheet, 24 gage, .0276 inch minimum thickness.
 4. Panel Width: 12 inches.
 5. Color: As selected by Architect from manufacturer's standard line.
- C. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.
- D. Expansion Joints: Same material, thickness and finish as exterior sheets; manufacturer's standard brake formed type, of profile to suit system.
- E. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- F. Anchors: Stainless steel.

2.03 MATERIALS

- A. Precoated Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, Structural Steel (SS) or Forming Steel (FS), with G90/Z275 coating; continuous coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

2.04 INSULATION

- A. See Section 07 21 13 - Board Insulation.

2.05 SUB FRAMING

- A. Manufacturer:
 1. Cascadia Windows LTD: Cascadia Clip; www.cascadia.com
 2. Acceptable Manufacturer/System:
 - a. Knight Wall System MFI-Systems; www.knightwallsystems.com
 - b. Substitutions: See Section 01 6000 - Product Requirements.

- B. Sub-framing Thermal Spacer: 100 % Pultruded glass fibre and thermoset polyester resin insulation clip.
- C. Thermal Spacer thickness for top, base and web: 3/16 inches nominal.
 - 1. Thermal spacer depth: 2 inches nominal.
 - a. Depth tolerance: ± 0.005 inches.
 - 2. Spacer Fasteners: High hex head washer head with sharp twin lead threaded design of heat treated corrosion resistant coated steel..
 - 3. Fastener: as recommended by manufacturer
- D. Girts
 - 1. Z-Girts: 18 gauge galvalume G60, 1 inch by 1 1/2 inch
 - 2. Hat Channel: 18 gauge galvalume G60, 7/8 inch with slotted flanges

2.06 ACCESSORIES

- A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.
- B. Sealants:
 - 1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
 - 2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
- C. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.
 - 1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.
- D. Field Touch-up Paint: As recommended by panel manufacturer.

2.07 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest practicable lengths.
- C. Fabricate corners in one continuous piece with minimum 18 inch returns.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building framing members are ready to receive panels.

3.02 PREPARATION

- A. Install sub framing perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane. Space at intervals indicated.
 - 1. Install in accordance to manufacturers recommendations.
 - 2. Thermal Spacer Installation: Clip thermal spacer to girt and fasten girt directly to substrate.
 - 3. Installation sequence for spacers, sub-framing, and insulation
 - a. Pre-punch or pre-drill holes in Z-girts and tracks to accommodate fasteners.
 - b. Position Z-girts directly over thermal spacer before installation of fasteners.
 - c. Completely install spacers, screws and sub-framing, prior to installing insulation.
 - d. Friction fit insulation in place.

3.03 INSTALLATION

- A. Install panels on walls in accordance with manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
- C. Fasten panels to structural supports; aligned, level, and plumb.
- D. Locate joints over supports.

- E. Provide expansion and control joints where indicated by manufacturer.
- F. Use concealed fasteners unless otherwise approved by Architect.
- G. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.04 CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Remove protective material from wall panel surfaces.
- C. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

END OF SECTION

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SECTION 07 54 19
PVC THERMOPLASTIC SINGLE-PLY ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fully Adhered system with PVC thermoplastic roofing membrane.
- B. Membrane flashings.
- C. Roofing accessories: stack boots, roofing expansion joints, and walkway pads.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements
- B. Section 05 31 00 - Steel Decking: Acoustical deck flute insulation.
- C. Section 06 10 00 - Rough Carpentry: Wood nailers and curbs.
- D. Section 07 01 50.19 - Preparation for Re-Roofing.
- E. Section 07 22 16 - Roof Board Insulation
- F. Section 07 62 00 - Sheet Metal Flashing and Trim: Counterflashings.
- G. Section 07 71 00 - Roof Specialties: Prefabricated roofing expansion joint flashing.
- H. Section 07 72 00 - Roof Accessories: Roof-mounted units; prefabricated curbs.
- I. Section 22 10 06 - Plumbing Piping Specialties: Roof drains.

1.03 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing 2017.
- C. ASTM D4434/D4434M - Standard Specification for Poly(Vinyl Chloride) Sheet Roofing 2021.
- D. NRCA (RM) - The NRCA Roofing Manual 2022.
- E. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.
 - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's written information listed below.
 - 1. Product data indicating membrane materials, flashing materials, fasteners, and adhesive.
 - 2. Preparation instructions and recommendations.
- C. Samples for Selection: Submit two samples 12 by 12 inches in size illustrating colored coating.
- D. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- E. Warranty:
 - 1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 2. Submit installer's certification that installation complies with all warranty conditions for the waterproof membrane.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty (20) years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section:
 - 1. Approved by membrane manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- B. Protect products in weather protected environment, clear of ground and moisture.

1.08 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

1.09 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Material Warranty: Provide membrane manufacturer's warranty agreeing to replace material that shows manufacturing defects within 20 years after installation.
- C. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind with wind speeds up to 55 mph or other natural causes.
 - 1. Warranty Term: 20 years.
 - 2. For repair and replacement include costs of both material and labor in warranty.
- D. Roofing Contractor Warranty: Contractor shall guarantee for 2 years, from the date of substantial completion, at their cost to make necessary repairs to the roof system resulting from faults or defects caused due to workmanship. Guarantee shall include but is not limited to the following: roof membrane, flashings, insulation, fasteners, walkways, expansion joints, pipe flashings and boots.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Carlisle SynTec
- B. Duro-Last Roofing, Inc
- C. Johns Manville
- D. Sarnafil, Inc
- E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ROOFING APPLICATIONS

- A. PVC Membrane Roofing: Single ply membrane, fully adhered, over insulation.
- B. Roofing Assembly Performance Requirements and Design Criteria:
 - 1. Roof Covering External Fire Resistance Classification: Class A when tested per UL 790.
 - 2. Wind Uplift:
 - a. Designed to withstand wind uplift forces calculated with ASCE 7.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Single Source Responsibility: Provide and install products from single source.
- B. Membrane:
 - 1. Material: Polyvinyl chloride (PVC) complying with ASTM D4434/D4434M.
 - 2. Reinforcing: Internal fabric.
 - 3. Thickness: 60 mils (0.060 inch), minimum.
 - 4. Sheet Width: Factory fabricated into largest sheets possible.
 - 5. Color: To be selected from manufacturer's standard line..
 - 6. Product:
 - a. Carlisle: SureFlex PVC. 60 mil
 - b. Duro-Last: 60 mil, Duro-Tuff
 - c. Johns Manville: 60 mil, JM SD Plus
 - d. Sarnafil: 60 mil, S 327-60 EnergySmart
- C. Seaming Materials: As recommended by membrane manufacturer.
- D. Flexible Flashing Material: Same material as membrane.

2.04 DECK SHEATHING AND COVER BOARDS

- A. Deck Sheathing and Cover Board: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/4 inch thick.
 - 1. Product: GP Dens-Deck Prime
 - a. Surfacing: Primed Fiberglass Mat.
 - b. Flexural Strength, Parallel (ASTM C473): 80 lbf, minimum.
 - c. Flute Span (ASTM E661): 5 inches.
 - d. Permeance (ASTM E96): Greater than 23 perms.
 - e. R-Value (ASTM C518): 0.56.
 - f. Water Absorption (ASTM C473): Less than 5 percent of weight.
 - g. Surface Water Absorption (ASTM C473): Nominal 1.0 grams.
 - h. Compressive Strength (Applicable Sections of ASTM C472): Nominal 900 pounds per square inch.
 - i. Flame Spread/ Smoke Development (ASTM E84): Not more than 0 Flame Spread, 0 Smoke Development
 - j. Combustibility (ASTM E136): Noncombustible
 - k. Fire resistance rating (UL 790 and ASTM E108): Class A
 - l. Mold Resistance (ASTM D3273): Scored a 10

2.05 INSULATION

- A. See Section 07 22 16 - Roof Board Insulation for roofing insulation.

2.06 ACCESSORIES

- A. Prefabricated Roofing Expansion Joint Flashing: Sheet butyl over closed cell foam backing seamed to galvanized steel flanges.
- B. Prefabricated Flashing Accessories:
 - 1. Corners and Seams: Same material as membrane, in manufacturer's standard thicknesses.
 - 2. Penetrations: Same material as membrane, with manufacturer's standard cut-outs, rigid inserts, clamping rings, and flanges.
 - 3. Walkway Rolls: Heat Weldable Walkway Rolls; 80 mils (0.080 inch)thick; gray membrane.
 - 4. Miscellaneous Flashing: Non-reinforced PVC membrane; 80 mils (0.080 inch) thick, in manufacturer's standard lengths and widths.
- C. Membrane Adhesive: As recommended by membrane manufacturer.
- D. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.

- E. Sealants: As recommended by membrane manufacturer.
- F. Cleaner: Manufacturer's standard, clear, solvent-based cleaner.
- G. Primer: Manufacturer's recommended product.
- H. Edgings and Terminations: As specified in Section 07 72 00 - Roof Specialties.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 PREPARATION, GENERAL

- A. Clean substrate thoroughly prior to roof application.

3.03 INSTALLATION - GENERAL

- A. Perform work in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Do not apply roofing membrane during unsuitable weather.
- C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.
- D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

3.04 MEMBRANE APPLICATION

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Fully Adhered Application:
 - 1. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints.
 - 2. Fully adhere one roll before proceeding to adjacent rolls.
- D. Seam Welding:
 - 1. Overlap edges and ends and seal seams by heat welding, minimum 2 inches.
 - 2. Cover all seams with manufacturer's recommended joint covers.
 - 3. Probe all seams once welds have thoroughly cooled. (Approximately 30 minutes.)
 - 4. Repair all deficient seams within the same day.
 - 5. Seal cut edges of reinforced membrane after seam probe is complete.
- E. At intersections with vertical surfaces:
 - 1. Fully adhere flexible flashing over membrane and up to nailing strips.
- F. Install roofing expansion joints where indicated. Make joints watertight.
- G. Install prefabricated joint components in accordance with manufacturer's instructions.
- H. Coordinate installation of roof drains and sumps and related flashings.

- I. Install walkway pads. Space pad joints to permit drainage.
- J. Daily Seal: Install daily seal per manufacturers instructions at the end of each work day. Prevent infiltration of water at incomplete flashings, terminations, and at unfinished membrane edges.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, for general requirements for field quality control and inspection.
- B. Require site attendance of roofing and insulation material manufacturers daily during installation of the Work.

3.06 CLEANING

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove wrappings, empty containers, paper, and other debris from the roof daily. Dispose of debris in compliance with local, State, and Federal regulations.
- C. Remove bituminous markings from finished surfaces.
- D. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- E. Repair or replace defaced or damaged finishes caused by work of this section.

3.07 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

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**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.
- B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Metal flashings embedded in masonry.
- B. Section 06 10 00 - Rough Carpentry: Wood nailers for sheet metal work.
- C. Section 07 54 19 - PVC Thermoplastic Single-Ply Roofing
- D. Section 07 71 00 - Roof Specialties: Manufactured copings, flashings, and expansion joint covers.
- E. Section 07 72 00 - Roof Accessories: Manufactured metal roof curbs.
- F. Section 07 92 00 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 ALTERNATIVES

- A. See Section 01 23 00 - Alternates, for product alternatives affecting this section.

1.04 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. 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.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.06 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.

1.07 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.

1.08 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.

1.09 WARRANTY

- A. Provide a 20 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 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.

2.02 SOFFIT SYSTEM

- A. Soffit panel to be nominal 12 inches wide perforated to all own 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

2.03 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.

2.04 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.

2.05 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 00
ROOF SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured roof specialties, including counterflashings, copings, fascias, and vents.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry
- B. Section 07 54 19 - PVC Thermoplastic Single-Ply Roofing
- C. Section 07 62 00 - Sheet Metal Flashing and Trim
- D. Section 07 72 00 - Roof Accessories: Manufactured curbs, roof hatches.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- B. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems 2017.
- C. AAMA 2605 - Voluntary Specification , Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2005.
- D. 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 on shape of components, materials and finishes, anchor types and locations.
- C. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
- D. Samples: Submit two samples, illustrating component shape, finish, and color.
- E. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Roof Edge Flashings and Copings:
 - 1. Architectural Products Co: www.archprod.com/
 - 2. ATAS International, Inc; Rapid-Lok Fascia: www.atas.com/
 - 3. Metal-Era Inc: www.metalera.com/
 - 4. Metal Roofing Systems, Inc; Rapid Lock Coping: www.metalroofingsystems.biz/
 - 5. MM Systems Corp.; Product FWC Wall Cap.

2.02 COMPONENTS

- A. Roof Edge Flashings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
 - 1. Configuration: Fascia, and edge securement for roof membrane.
 - 2. Material: Formed steel sheet, galvanized, 22 gage, 0,03 inch thick, minimum.
 - 3. Finish: 70 percent polyvinylidene fluoride.
 - 4. Color: To be selected by Architect from manufacturer's standard range.

2.03 PREFABRICATED COPING SYSTEMS

- A. Manufacturer:
 - 1. Metal Era, Waukesha, Wisconsin:
 - 2. Acceptable Manufacturers:
 - a. MM Systems Company, Tucker, Georgia
 - b. Architectural Products Co
 - c. W.P. Hickman, Asheville, North Carolina
 - d. Substitutions: See Section 01 60 00 - Product Requirements
- B. Perma-Tite Coping: Metal coping cap with snap-on design with 20-gauge, galvanized steel anchor clips and factory-applied stainless steel springs that ensure long-term positive attachment, extruded anchor bar and galvanized steel anchor/support cleats for capping parapet wall. The system shall be watertight, maintenance free, and does not require exposed fasteners. Joints shall be a butt type with concealed splice plates.
- C. Characteristics:
 - 1. Coping sections shall expand and contract freely while locked in place on anchor cleats.
 - 2. Coping sections shall lock to extruded aluminum anchor bar and anchor cleats by mechanical pressure from hardened stainless steel springs factory attached to anchor cleats.
 - 3. All splice plates include factory applied dual non-curing sealant strips capable of providing a watertight seal.
 - 4. Metal: 0.050" aluminum with Kynar coating.
 - a. Color to be selected by the Architect from manufacturer's standards
- D. Coping cap: length of 12'-0" (3.65 m), widths manufactured to job requirements.
- E. Coping vertical outside face to be: 6", back leg standard to be 3-1/2" nominal, custom size by request, manufactured to job requirements.
- F. Concealed splice plates: 8" wide. Finish to match finish of coping cap with factory applied dual non-curing sealant strips.
- G. Extruded Anchor Bar: .100" mill extruded aluminum, pre-punched, 12" wide and installed 4'-0" o.c. Integrated with anchor/support cleat.
- H. Anchor/Support Cleat: 20 ga. prepunched galvanized cleat with stainless steel spring mechanically locked to cleat normally 12" (305 mm) wide @ 6'-0" (1525 mm) on center. Mechanically fastened as indicated and detailed. Integrated with extruded anchor bar.
- I. Fasteners: Corrosion resistant fasteners shall be provided by Metal-Era. No exposed fasteners shall be permitted.
- J. Finishes: Shall be select from standard pre-coated Kynar 500 from manufacturer's colors.
- K. Accessories:
 - 1. Corners, end caps, pier caps, etc. shall be fabricated by the coping manufacturer.
 - a. Welded assembly shall be used to maintain watertight integrity.
- L. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-3 to positive and negative design wind pressure as defined by applicable local building code.

2.04 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 60 00 - 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.

2.05 FINISHES

- A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as indicated.

2.06 ACCESSORIES

- A. Sealant for Joints in Linear Components: As recommended by component manufacturer.
- B. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
- C. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.

END OF SECTION

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**SECTION 07 72 00
ROOF ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Curbs.
- B. Roof penetrations mounting curbs.

1.02 RELATED REQUIREMENTS

- A. Section 07 54 19 - PVC Thermoplastic Single-Ply Roofing
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Roof accessory items fabricated from sheet metal.
- C. Section 07 71 00 - Roof Specialties: Other manufactured roof items.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Warranty Documentation:
 - 1. Submit manufacturer warranty.
 - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 ROOF CURBS

- A. Manufacturers:
 - 1. AES Industries Inc: www.aescurb.com/#sle.
 - 2. The Pate Company: www.patecurbs.com/#sle.
 - 3. LMCurbs; Roof Curbs: www.lmcurbs.com/#sle.
 - 4. MKT Metal Manufacturing: www.mktduct.com/#sle.
 - 5. Roof Products & Systems (RPS): www.rpscurebs.com/#sle.
 - 6. Nystrom Building Products.
 - 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Roof Curbs Mounting Assemblies: Factory fabricated hollow sheet metal construction, internally reinforced, and capable of supporting superimposed live and dead loads and designated equipment load with fully mitered and sealed corner joints welded or mechanically fastened, and integral counterflashing with top and edges formed to shed water.
 - 1. Roof Curb Mounting Substrate: Curb substrate consists of either PVC membrane or Asphalt shingles.
 - 2. Sheet Metal Material:
 - a. Aluminum: 0.080 inch minimum thickness, with 3003 alloy, and H14 temper.
 - 1) Color: As selected by Architect from manufacturer's standard line of colors.
 - 3. Provide layouts and configurations indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

- A. Clean installed work to like-new condition.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

**SECTION 07 84 00
FIRESTOPPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping of joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.
- B. Smoke stopping of all penetrations and interruption to smoke rated assemblies, whether indicated on drawings or not and other openings indicated.
- C. Requirements for materials installed in cavities, around penetrations, and openings in floors, walls, partitions, and other building components to prevent spread of fire and smoke.

1.02 RELATED REQUIREMENTS

- A. Section 01 70 00 - Execution and Closeout Requirements: Cutting and patching.
- B. Section 09 21 16 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a (Reapproved 2017).
- B. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems 2015 (Reapproved 2019).
- C. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus 2020.
- D. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies 2013 (Reapproved 2017).
- E. ITS (DIR) - Directory of Listed Products current edition.
- F. FM 4991 - Approval Standard for Firestop Contractors 2013.
- G. FM (AG) - FM Approval Guide current edition.
- H. FA (AG) - FM Approval Guide; Factory Mutual Research Corporation; current edition.
- I. UL 1479 - Standard for Fire Test of Penetration Firestops; Current Edition
- J. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems Current Edition, Including All Revisions.
- K. UL (FRD) - Fire Resistance Directory Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration.
- C. Product Data: Provide data on product characteristics.
- D. Indicate UL System Number for each type of penetration.
- E. Sustainable Design Submittal: Submit VOC content documentation for all non-preformed materials.
- F. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- G. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- H. Installer Qualification: Submit qualification statements for installing mechanics.

1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
 - 2. Current evaluation reports published by CABO, ICBO, or BOCA will be considered as constituting an acceptable test report.
 - 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
 - 2. Verification of minimum three years documented experience installing work of this type.
 - 3. Verification of at least five satisfactorily completed projects of comparable size and type.
 - 4. Licensed by local authorities having jurisdiction (AHJ).
 - 5. Approved by firestopping manufacturer.
- D. Installing Mechanic's Qualifications: Trained by firestopping manufacturer and able to provide evidence thereof.

1.06 MOCK-UP

- A. Install one firestopping assembly representative of each fire rating design required on project.
 - 1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.
 - 2. Where firestopping is intended to fill a linear opening, install minimum of 1 linear ft.
- B. Obtain approval of authorities having jurisdiction (AHJ) before proceeding.
- C. If accepted, mock-up will represent minimum standard for the Work.
- D. If accepted, mock-up may remain as part of the Work. Remove and replace mock-ups not accepted.

1.07 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Manufacturers:
 - 1. A/D Fire Protection Systems Inc.: www.adfire.com.
 - 2. 3M Fire Protection Products: www.3m.com/firestop.
 - 3. Hilti, Inc: www.us.hilti.com/#sle.
 - 4. Nelson FireStop Products: www.nelsonfirestop.com.
 - 5. Specified Technologies, Inc.: www.stifirestop.com.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrate and the items penetrating the firestopping
- C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

- D. Accessories: Use components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance rated system.
Accessories include but are not limited to
1. Permanent forming/damming/backing materials
 2. Temporary forming materials
 3. Substrate primers
 4. Collars
 5. Sleeves

2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.
- B. Head-of-Wall Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.
- C. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
- D. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

2.03 FIRESTOPPING ASSEMBLIES - MATERIALS

- A. Firestopping at Uninsulated Metallic Pipe and Conduit Penetrations, of diameter 4 inches or less:
1. Tremco, Tremstop IA
 2. Hilti CP 601S Elastomeric Firestop Sealant
 3. STI SpecSeal Sealant SSS
 4. 3M Fire Barrier CP25
 5. Substitution: See Section 01 6000 - Product Requirements
- B. Firestopping at Combustible Pipe and Conduit Penetrations, of diameter 4 inches or less:
1. Tremco, Tremstop WS
 2. Hilti FS-ONE Max Intumescent Firestop Sealant
 3. 3M Fire Barrier FS-195 Wrap Strip
 4. STI Wrap Strip SSW
 5. Substitution: See Section 01 6000 - Product Requirements
- C. Firestopping at Electrical outlet boxes in gypsum wallboard assemblies
1. Tremco, Tremstop MP Putty Pad
 2. STI, Spec Seal SSP Putty Pad
 3. 3M, Fire Barrier Moldable Putty Pad MPP
 4. Hilti, CP617 Firestop Putty Pad
 5. Substitution: See Section 01 6000 - Product Requirements
- D. Firestopping at Cable Tray Penetrations multiple steel and copper pipes, electrical busways in raceways:
1. Tremco, Fyre-Sil and Fyre-Sil S/L
 2. STI SpecSeal lightweight mortar SSM
 3. Hilti FS 635 Trowelable Firestop Compound
 4. 3M Fire Barrier CS-195 Composite Strip
 5. Substitution: See Section 01 6000 - Product Requirements
- E. Firestopping at Control Joints (without Penetrations):
1. Tremco, Tremstop DS

2. Hilti CP 601 S Elastomeric Firestop Sealant
 3. STI ES Elastomeric Sealant
 4. 3M (Dow Corning Fire Stop Sealant 2000)
 5. Substitution: See Section 01 6000 - Product Requirements
- F. Firestopping at head of walls without penetrations
1. Tremco, Tremstop Acrylic
 2. 3M FireDam Spray 100
 3. STI, AS200
 4. Hilti, CFS-SP WB
 5. Substitution: See Section 01 6000 - Product Requirements

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- C. Install labeling required by code.

3.04 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

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

- A. Section 07 84 00 - Firestopping: Firestopping sealants.
- B. Section 08 71 00 - Door Hardware: Setting exterior door thresholds in sealant.
- C. Section 09 21 16 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.
- D. Section 09 22 16 - Non-Structural Metal Framing: Sealing between framing and adjacent construction in acoustical and sound-rated walls and ceilings.
- E. Section 23 31 00 - HVAC Ducts and Casings: Duct sealants.

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 MOCK-UP

- A. Provide mock-up of sealant joints in conjunction with window, wall, and air barrier system under provisions of Section 01 43 00 - Quality Requirements.
- B. Construct mock-up with specified sealant types and with other components noted.
- C. Locate where directed.
- D. Mock-up may not remain as part of the Work.

1.08 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.

1.09 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.
 - 5. Type 6 - In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
- 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.
- D. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

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

Division 08

Openings

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**SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hollow metal frames for wood doors.
- B. Accessories, including glazing, louvers, and matching panels.

1.02 RELATED REQUIREMENTS

- A. Section 08 1416 - Flush Wood Doors
- B. Section 08 71 00 - Door Hardware.
- C. Section 09 91 13 - Exterior Painting: Field painting.
- D. Section 09 91 23 - Interior Painting: Field painting.
- E. Division 26 - Electrical
- F. Division 27 - Communications
- G. 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 A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100) 2017.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames 2020.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- F. 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.
- G. 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.
- H. BHMA A156.115 - Hardware Preparation In Steel Doors And Steel Frames 2016.
- I. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters 2020.
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- K. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; 2000 (ANSI/DHI A115 Series).
- L. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames 2002.
- M. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames 2011.
- N. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2017.
- O. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.
- P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- Q. 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. Design Submittals: Manufacturer to submit anchor design analysis calculations for blast-resistant doors signed and sealed by specialty design engineer experienced in this type of work and licensed in Ohio.
- F. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- G. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
- H. 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.

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. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
 7. 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".
 8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvanized) 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 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. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- D. Mullions for Pairs of Doors: Fixed, except where removable is indicated, with profile similar to jambs.
- E. Transom Bars: Fixed, of profile same as jamb and head.
- F. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.04 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.

2.05 ACCESSORIES

- A. Glazing: As specified in Section 08 80 00, factory installed.
- B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- C. Astragals for Double Doors: Specified in Section 08 7100.
- D. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.
- E. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- F. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.
- G. Closed-cell polyurethane spray foam insulation:
 - 1. Foam Sealant: A one-component, minimal expanding, low pressure-build, flexible polyurethane foam formulated to seal the air gap around door frame and the rough opening. The foam is to expand and generate an effective seal, and will not to distort or bow door frames.
 - 2. Foam insulation required in exterior applications between all door head, and jamb.

2.06 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.

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. Comply with glazing installation requirements of Section 08 80 00.
- G. Coordinate installation of electrical connections to electrical hardware items.
- H. Install magnetic hold open devices on doors supplied by Division 28.
- I. 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

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**SECTION 08 14 16
FLUSH WOOD DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush and flush glazed configuration; fire-rated, non-rated, and acoustical.

1.02 RELATED REQUIREMENTS

- A. Section 01 60 00 Product Requirements : FSC Wood
- B. Section 08 11 13 - Hollow Metal Doors and Frames.
- C. Section 08 71 00 - Door Hardware.
- D. Division 26 - Electrical
- E. Division 27 - Communications
- F. Division 28 - Electronic Safety

1.03 REFERENCE STANDARDS

- A. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
- B. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.
- C. UL 1784 - Standard for Air Leakage Tests of Door Assemblies Current Edition, Including All Revisions.
- D. WDMA I.S. 1A - Interior Architectural Wood Flush Doors 2021, with Errata.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. See Section 01 60 00 Product Requirements for Certified Wood
- C. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- D. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
 - 1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- E. Specimen warranty.
- F. Samples: Submit two samples of door veneer, 12 x 12 inch in size illustrating wood grain, stain color, and sheen.
- G. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Section 1300, Custom Grade.
- B. Finish doors in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Section 1500.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Installed Fire-Rated Door and Transom Panel Assembly: Conform to fire-rating as indicated.
- B. Smoke and Draft Control Doors : In addition to required fire rating, comply with air leakage requirements of UBC Std 7-2, Part II; with "S" label; if necessary, provide additional gasketing or edge sealing.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.08 PROJECT CONDITIONS

- A. Coordinate the work with door opening construction, door frame and door hardware installation.

1.09 COORDINATION

- A. Contractor shall be responsible for coordinating and obtaining necessary information from Hardware and Frame manufacturers to provide door supplier with approved hardware and frame schedules with templates.

1.10 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. Include coverage for delamination of veneer and defective materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Veneer Faced Doors:
 - 1. Masonite Architectural, Marshfield-Algoma: <https://architectural.masonite.com>
 - 2. Eggers Industries: www.eggersindustries.com/#sle.
 - 3. Graham Wood Doors: www.grahamdoors.com.
 - 4. Marshfield DoorSystems, Inc: www.marshfelddoors.com/#sle.
 - 5. Ohio Valley Door; www.ohiovalleydoor.com.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DOORS AND PANELS

- A. Doors: Refer to drawings for locations and additional requirements.
 - 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with WDMA I.S. 1A.
 - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
 - 3. Doors to have a certification authorized under authority of the Forest Stewardship Council (FSC) requirements as pertaining to certified sourcing, recycled material content and chain-of-ownership requirements for materials used in construction of the door.
 - 4. Doors have no added urea-formaldehyde resins.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at each location.
 - 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
 - 3. Smoke and Draft Control Doors (Indicated as "S" on Drawings): In addition to required fire rating, provide door assemblies tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch wg pressure at both ambient and elevated temperatures for "S" label; if necessary, provide additional gasketing or edge sealing.
 - 4. Wood veneer facing with factory transparent finish as indicated on drawings.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: AWI P-200, Section 1300, Type particleboard core (PC) (PC-5; PC-7 not acceptable).
- B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.
- C. Sound-Rated Doors: Equivalent to type, with particleboard core (PC) construction as required to achieve STC rating specified; plies and faces as indicated above.

2.04 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: White Oak, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
 - 1. Grade: Custom grade with 'A' faces
 - 2. WDMA I.S. 1-A Performance Grade: Extra Heavy Duty
 - 3. Vertical Edges: Same species as face veneer.
 - 4. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.
 - 5. Transoms: Continuous match to doors.
- B. Facing Adhesive: Type I - waterproof.

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
- C. Fabricate fire rated doors in accordance with UL requirements. Attach fire rating label to door.
- D. Provide solid blocks at lock edge and top of door for closer for hardware reinforcement.
 - 1. Provide solid blocking for other throughbolted hardware.
- E. Vertical Exposed Edge of Stiles - Veneer Faces: Of same species as veneer facing.
- F. Fit door edge trim to edge of stiles after applying veneer facing.
- G. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- H. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- I. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- J. Provide edge clearances in accordance with the quality standard specified.
- K. Provide edge clearances in accordance with AWI 1600.

2.06 FACTORY FINISHING - WOOD VENEER DOORS

- A. Finish work in accordance with WDMA I.S. 1A for grade specified and as follows:
 - 1. Transparent:
 - a. System - TR-6 Catalyzed Polyurethane.
 - b. Stain: As selected by Architect.
 - c. Sheen: Satin.
- B. Factory finish doors in accordance with approved sample.
- C. Seal door top edge with color sealer to match door facing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Install magnetic hold open devices supplied by Division 28.
- C. Trim door height by cutting bottom edges to a maximum of 3/4 inch (19 mm).
- D. Use machine tools to cut or drill for hardware.
- E. Coordinate installation of doors with installation of frames and hardware.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

END OF SECTION

**SECTION 08 31 00
ACCESS DOORS AND PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall access door and frame units.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00: Openings in masonry.
- B. Section 09 91 23 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

- A. 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.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of each access door and/or panel unit.
- D. Manufacturer's Installation Instructions: Indicate installation requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

1.06 PROJECT CONDITIONS

- A. Coordinate the work with other work requiring access doors.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Wall-Mounted Units:
 - 1. Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
 - 2. Size: 24 inch by 24 inch.
 - 3. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
 - 4. Masonry Mounting Criteria: Provide surface-mounted frame with door surface flush with frame surface.

2.02 WALL-MOUNTED UNITS

- A. Manufacturers:
 - 1. ACUDOR Products Inc: www.acudor.com/#sle.
 - a. Wall Units: MS-7000 Series
 - 2. Acceptable Manufacturers:
 - a. Cendrex, Inc: www.cendrex.com/#sle.
 - b. Karp Associates, Inc: www.karpinc.com/#sle.
 - c. Milcor, Inc: www.milcorinc.com/#sle.
 - d. Nystrom, Inc: www.nystrom.com/#sle.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.
- C. Aluminum Window openings.
- D. Weatherstripping.

1.02 RELATED REQUIREMENTS

- A. Section 01 60 00 - Product Requirements
- B. Section 05 12 00 - Structural Steel Framing: Steel attachment members.
- C. Section 07 25 00 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.
- D. Section 07 84 00 - Firestopping: Firestop at system junction with structure.
- E. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- F. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.
- G. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site 2015.
- B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document) 2015.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2014 (2015 Errata).
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- F. ASTM E 547 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential; 2000 (Reapproved 2009).
- G. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference 2015.
- H. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting two weeks before starting work of this section; require attendance by all affected installers.
- C. Convene one month before starting work of this section to coordinate power and security requirements.
- D. Review preparation and installation procedures and coordinating and scheduling required with related work.
- E. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. General Requirements

1. Provide all submittals in a timely manner to meet the required construction completion schedule.
 2. Shop drawings must be prepared wholly by the manufacturer or authorized representative of the manufacture.
 - a. Provide documentation of authorization if shop drawing are not prepared by manufacturer.
- B. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
 - C. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details .
 - D. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required. Provide 3D isometric drawings with submittals. All submittal drawings are required to be kept on site for review by contractors, A/E team, CM, and Commissioning team members.
 - E. Samples: Submit two samples 12 x 4 inches in size illustrating finished aluminum surface, glass, glazing materials.
 - F. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
 - G. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
 - H. Test Results: Provide test results for performance requirements from an independent testing agency for standard systems being used.
 - I. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
 - J. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 PROJECT CONDITIONS

- A. Coordinate the work with installation of related components or materials.

1.09 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.10 COORDINATION

- A. Contractor shall be responsible for coordinating and obtaining necessary information from Hardware and Frame manufacturers to provide door supplier with approved hardware and frame schedules with templates.

1.11 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

- B. Products: Submit a written warranty, executed by the manufacturer, for a period of 5 years from the date of substantial completion, against defective materials or workmanship, including substantial non-compliance with applicable specification requirements and industry standards, which results in premature failure of the storefront system, finish, factory-glazed glass, or parts, outside of normal wear.
 - 1. In the event that storefront system or components are found defective, manufacturer will repair or provide replacements without charge.
 - 2. Warranty for all components must be direct from the manufacturer (non pass-through) and non pro-rated for the entire term. Warranty must be assignable to the non-residential owner, and transferable to subsequent owners though its length.
- C. Installation: Submit a written warranty, executed by the storefront installer, for a period of 2 years from the date of substantial completion, against defective materials or workmanship, including substantial non-compliance with applicable specification requirements, which result in premature failure.
 - 1. In the event that installation of storefront system or components is found to be defective, installer will repair or provide replacements without charge.
- D. Provide 10 year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

- A. Application:
 - 1. Exterior door frame with multiple sidelights or transoms
 - 2. Exterior storefront
 - 3. Exterior windows
- B. Front-Set Style, Thermally-Broken:
 - 1. Basis of Design: Tubelite Inc; Product T24650 Series; www.tubelite.com
 - 2. Acceptable Manufacturers
 - a. Kawneer, Trifab VersaGlaze 601T Framing System
 - b. YKK America Inc; Product YES 60TU; www.ykkap.com
 - c. Oldcastle Building Envelope; Product 6000 series; www.oldcastle.com
 - d. Substitution Procedures: See Section 01 60 00 - Product Requirements
 - 3. Vertical Mullion Dimensions: 2 inches wide by 6 inches deep.
 - 4. Glazing Option: 1 inch
 - 5. Glass Location: Front Glazed system
- C. Front-Set Style, Thermally-Broken:
 - 1. Basis of Design: Tubelite Inc; Product 14000T Series; www.tubelite.com
 - 2. Acceptable Manufacturers
 - a. Kawneer, Trifab VersaGlaze 451T
 - b. YKK America Inc; Product YES 45TU; www.ykkap.com
 - c. Oldcastle Building Envelope; Product 3000 series; www.oldcastle.com
 - d. Substitution Procedures: See Section 01 60 00 - Product Requirements
 - 3. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
 - 4. Glazing Option: 1 inch
 - 5. Glass Location: Front Glazed system
- D. Substitutions: See Section 01 60 00 - Product Requirements.
 - 1. For any product not identified as "Basis of Design", submit information as specified for substitutions.

2.02 BASIS OF DESIGN -- FRAMING FOR MONOLITHIC GLAZING

- A. Application:

1. Interior vestibule door frames
 2. Interior storefronts systems with doors
 3. Interior windows
- B. Center-Set Style:
1. Basis of Design: Tubelite Inc.; Product 4500 Series: www.tubeliteinc.com.
 2. Acceptable Manufacturers
 - a. Kawneer Trifab, VersaGlaze 450
 - b. YKK AP America Inc; Product YES 45FS: www.ykkap.com.
 - c. Oldcastle Building Envelope; Product FG2000: www.oldcastlebe.com.
 - d. Substitution Procedures: See Section 01 6000 - Product Requirements.
 3. Vertical Mullion Dimensions: 1-3/4 inches wide by 4-1/2 inches deep.
 4. Glazing Option: 1/4 inch

2.03 BASIS OF DESIGN -- SWINGING DOORS

- A. Manufacturer
1. Cross Aluminum Products Inc., www.crossaluminum.com
 2. Acceptable Manufacturers.
 - a. Tubelite Inc; Monumental Entrance
 - b. Kawneer North America; 500 Heavy Wall Entrance
 - c. Old Castle Building Envelope; www.oldcastlebe.com
 - d. Substitutions: See Section 01 60 00 - Product Requirements
- B. Aluminum Flush doors
1. Product: WS-500 Series, Aluminum Flush Doors
 2. Wide Style.
 3. Door Opening Size: refer to drawings
 4. Door Assembly:
 - a. Door Assembly:
 - 1) Door Stile: To be aluminum alloy 6063; temper to be T5 with a minimum 3/16" wall thickness.
 - 2) Stile and Rail Thickness: To be 1 3/4" thick tubular extrusion with minimum 3/16" wall thickness.
 - b. Stile Width: As shown on the drawings
 - c. Rail Widths: As shown the drawings
 - d. Pattern: To be smooth.
- C. Materials & Accessories
1. Aluminum:
 - a. ASTM B 221, alloy and temper to be 6063 T-5
 2. Internal Reinforcement
 - a. Exposed:
 - 1) Type: Fasteners exposed will be Philips flathead fasteners unless provided by other supplier.
 - 2) Finish: Fasteners to match appropriate finish on standard doors and frames.
 - 3) Concealed: To be standard according to manufacturer's standards.
 3. Weather Stripping
 - a. Wool Pile
 - 1) Material: Solid Propylene Base with resilient fibers.
 - 2) Color: Manufacturer's standard black color.
 4. Glazing
 - a. Door Glazing: Interlocking door glazing to be screw fastened and removable from interior with moisture seal foam tape applied to both interior and exterior sides of door. Exterior glazing to be non-removable.

- b. Material: To be 1/8" thick extruded channels-6063-T5.
 - c. Color: To match finish of door.
- 5. Frame Glazing: Exterior side Snap-in glazing. Frame gasket to be flush glaze extruded rubber compound; EPDM.
 - a. Material: To be aluminum extruded channels-6063-T5.
 - b. Color: To match finish of frame.
- 6. Thermal Bar
 - a. Mechanically attached to thermally break tubular extrusions.
 - 1) Material: To be Polyamide 6.6 with 25% glass fibers
 - 2) Color: Manufacturer's standard black color.
- 7. Hardware
 - a. Hardware Preparation: To be fabricated at factory according to hardware templates provided.
 - b. Hardware Installation: To factory install all applicable and supplied hardware to doors and frames.
 - c. Hardware Reinforcement: To provide necessary reinforcement for proper longevity and hardware function; ASTM B 209 and/or ASTM 308.
 - d. Door Hardware
 - 1) Weatherstrip by this section
 - (a) Wool pile: Solid Propylene Base with resilient fibers in a standard black color.
 - 2) Doorstop: CDM - 32
 - (a) Wall Thickness: To be 3/16" thick for receiving applicable hardware.
 - (b) Profile Height: To be no less than 5/8" high.
 - (c) Snap-in: Fits standard manufacturer's door jamb profiles.
 - 3) See Section 08 71 00 Hardware for additional requirements.

2.04 COMPONENTS

- A. Glazing: As specified in Section 08 80 00.

2.05 MATERIALS

- A. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.
- B. Structural Supporting Anchors Attached to Structural Steel: Design for bolted attachment.
- C. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch minimum thickness; finish to match framing members.
- D. Concealed Flashings: Stainless steel, 26 gage, 0.0187 inch minimum thickness.
- E. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.
- F. Concealed Flashings: 0.018 inch thick stainless steel.
- G. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- H. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.06 FINISHES

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick.
 - 1. Color: Dark Bronze Anodized Finish

2.07 HARDWARE

- A. For each door, include weatherstripping and sill sweep strip.
- B. Other Door Hardware: As specified in Section 08 71 00.

- C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
- D. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.

2.08 ACCESSORIES

- A. Closed-cell polyurethane spray foam insulation: ASTM C 1029, Type II, 1.5 lb.cu.ft.
 - 1. Foam insulation required between all windows and doors at head, jamb, and sill

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Install foam insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of sealant and secure.
- J. Install hardware using templates provided.
 - 1. See Section 08 71 00 for hardware installation requirements.
- K. Install glass and infill panels in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.
- L. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, for independent testing and inspection requirements. Inspection will monitor quality of installation and glazing.
- B. The right is reserved by the Owner/Architect to have the installation tested. The cost of this test is at the Owner's expense.
- C. Test installed storefront for water penetration in accordance with ASTM E1105 with a uniform test pressure difference of 2.86 lbf/sq ft.
 - 1. If unit fails, test additional units at Contractor's expense.
- D. Replace units that have failed field testing and retest until performance is satisfactory.

3.05 ADJUSTING

- A. Adjust operating hardware and sash for smooth operation.

3.06 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.
- C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.
- C. Protect finished work from damage.

END OF SECTION

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**SECTION 08 71 00
DOOR HARDWARE**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

- B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

- C. Related Sections:

1. Division 08 Section "Hollow Metal Doors and Frames".
2. Division 08 Section "Flush Wood Doors".
3. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
4. Division 28 Section "Access Control Hardware Devices".

- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. Ohio Building Code 2017, Local Amendments.

- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:

1. ANSI/BHMA Certified Product Standards - A156 Series.
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.
4. UL 305 - Panic Hardware.

5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
 - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - b. Complete (risers, point-to-point) access control system block wiring diagrams.
 - c. Wiring instructions for each electronic component scheduled herein.

2. **Electrical Coordination:** Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. **Keying Schedule:** After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- E. **Informational Submittals:**
 1. **Product Test Reports:** Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- F. **Operating and Maintenance Manuals:** Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

- A. **Manufacturers Qualifications:** Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. **Certified Products:** Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. **Installer Qualifications:** A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. **Door Hardware Supplier Qualifications:** Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. **Source Limitations:** Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

- G. **Keying Conference:** Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
1. Function of building, purpose of each area and degree of security required.
 2. Plans for existing and future key system expansion.
 3. Requirements for key control storage and software.
 4. Installation of permanent keys, cylinder cores and software.
 5. Address and requirements for delivery of keys.
- H. **Pre-Submittal Conference:** Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 3. Review sequence of operation narratives for each unique access controlled opening.
 4. Review and finalize construction schedule and verify availability of materials.
 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. **Templates:** Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01,

Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
5. Manufacturers:
 - a. Hager Companies (HA) - AB Series, 3 knuckle.
 - b. McKinney (MK) - TA Series, 3 knuckle.
 - c. dormakaba Best (ST) - CB Series, 3 knuckle.

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:
 - a. Hager Companies (HA).
 - b. Pemko (PE).
 - c. Dormakaba Best (ST).

2.3 DOOR OPERATING TRIM

- A. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 2. Pulls, where applicable, shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
 3. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
 4. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Rockwood (RO).
 - c. Trimco (TC).

2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
1. Manufacturers:
 - a. Corbin Russwin Hardware (RU).
 - b. No Substitution.
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
1. Threaded mortise cylinders with rings and cams to suit hardware application.
 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 4. Tubular deadlocks and other auxiliary locks.
 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 6. Keyway: Match Facility Standard.
- C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- D. Keying System: Each type of lock and cylinders to be factory keyed.
1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 3. Existing System: Field verify and key cylinders to match Owner's existing system.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).
4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Two (2).

F. Construction Keying: Provide temporary keyed construction cores.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.5 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:

- a. Lund Equipment (LU).
- b. MMF Industries (MM).
- c. Telkee (TK).

P. Electronic Key Management System: Provide an electronic key control system with Stand-alone Plug and Play features including advanced RFID technology. Touchscreen interface with PIN access for keys individually locked in place. Minimum 1,000 system users and 21 iFobs for locking receptors. System shall have a minimum 250,000 audit events screen displayed or ability to be exported via USB port.

1. Manufacturers:

- a. Medeco (MC).
- b. Traka (TA).

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed.

1. Locks shall meet or exceed the requirements of ANSI/BHMA A156.2 Series 4000, Grade 1 with all standard trims, as follows:
 - a. Cycle Test: ANSI/BHMA A156.2 Grade 1 requirements with no lever sag.

- b. Abusive Locked Lever Torque: Exceed 3,100 in-lb with no entry; lock to maintain egress functionality in compliance with BHMA certification requirements.
 - c. Offset Lever Pull: Exceed 1,600 lbs with no entry (8 times ANSI/BHMA A156.2 requirements).
 - d. Latch Retraction with Preload: Exceed 100 lb preload while maintaining ANSI/BHMA requirements for operation in warped doors (2 times ANSI/BHMA A156.2 requirements).
- 2. Vertical Impact: Exceed 100 vertical impacts (20 times ANSI/BHMA A156.2 requirements).
 - 3. Furnish with solid cast levers, standard 2 3/4" backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.
 - 4. Locks are to be non-handed and fully field reversible.
 - 5. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - CLX3300 Series.
 - b. No Substitution.

2.7 ELECTROMECHANICAL EXIT DEVICES

- A. Electromechanical Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices subject to same compliance standards and requirements as mechanical exit devices. Electrified exit devices to be of type and design as specified below and in the hardware sets.
 - 1. Energy Efficient Design: Provide devices which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
 - 2. Where conventional power supplies are not sufficient, include any specific controllers required to provide the proper inrush current.
 - 3. Motorized Electric Latch Retraction: Devices with an electric latch retraction feature must use motors which have a maximum current draw of 600mA. Solenoid driven latch retraction is not acceptable.
 - 4. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ED5000 Series.

2.8 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
 - 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.

2. **Standards:** Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. **Cycle Testing:** Provide closers which have surpassed 15 million cycles.
4. **Size of Units:** Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
5. **Closer Arms:** Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
6. **Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.**
7. **Closer Accessories:** Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard..

1. **Manufacturers:**
 - a. Norton Rixson (NO) - 7500 Series.

C. Door Closers, Surface Mounted (Cam Action): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, high efficiency door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be of the cam and roller design, one piece cast aluminum silicon alloy body with adjustable backcheck and independently controlled valves for closing sweep and latch speed.

1. **Manufacturers:**
 - a. Norton Rixson (NO) - 2800ST Series.

2.9 ARCHITECTURAL TRIM

A. Door Protective Trim

1. **General:** Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. **Size:** Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width

and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Rockwood (RO).
 - c. Trimco (TC).

2.10 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Rockwood (RO).
 - c. Trimco (TC).

2.11 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 - 1. National Guard Products (NG).
 - 2. Pemko (PE).
 - 3. Reese Enterprises, Inc. (RE).

2.12 ELECTRONIC ACCESSORIES

- A. Intelligent Switching Power Supplies: Provide power supplies with single, dual or multi-voltage configurations at 12 and/or 24VDC. Power Supply shall have battery backup function with an integrated battery charging circuit. The power supply shall have a standard, integrated Fire Alarm Interface (FAI). The power supply shall provide capability for secondary voltage, power distribution, direct lock control and network monitoring through add on modules. The power supply shall be expandable up to 16 individually protected outputs. Output modules shall provide individually protected, continuous outputs and/or individually protected, relay controlled outputs. Network modules shall provide remote monitoring functions such as status reporting, fault reporting and information logging.
 - 1. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
 - 2. Manufacturers:
 - a. Securitron (SU) - AQL Series.

2.13 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.14 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."

4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

- B. Manufacturer's Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RU - Corbin Russwin
4. HS - HES
5. RO - Rockwood
6. NO - Norton
7. OT - Other
8. SU - Securitron

Hardware Sets

Set: 1.0

Doors: A101b, A106a

1 Continuous Hinge	CFM-SLF-HD1 x PT		PE
1 Rim Exit Device, Nightlatch	ED5200S K157ET M110 M92 MELR M51	630	RU ⚡
1 Rim Cylinder	CR3080 x GMK	626	RU
1 Door Pull	RM3311-24 Mtg-Type 12XHD	US32D-	RO

22094.00 Tipp City Government
Center Infill Addition
Bid Documents

Door Hardware

08 71 00 - 15
February 2, 2023

		316	
1 Surface Closer	CPS7500	689	NO
1 Arm Support Bracket	6890	689	NO
1 Blade Stop Spacer	6891	689	NO
1 Threshold	279x292AFGPK x MSES25SS		PE
1 Weatherstrip	- integral within construction of door and frame assembly		00
1 Sweep	29326CNB x TKSP8		PE
1 Door Position Switch	- Provided by Owner		OT
1 Power Supply	AQL4-R8E1 (electric latch retraction)		SU ⚡
1 Card Reader	- Provided by Owner		OT

Notes: Operation Description: Door normally closed and locked. Key override outside retracts latch bolt. Valid use of card reader outside retracts latch bolt of exit device. No dogging of latch bolt. Exit device equipped with electric latch retraction and REX signal switch in push rail for shunting of door monitoring upon egress.
Free egress always permitted.

Set: 2.0

Doors: A107a, A108a

3 Hinge, Full Mortise	TA714 (NRP)	US26D	MK
1 Entrance Lock	CLX3351 PZD C6 GMK	626	RU
1 Wall Stop	RM861	US32D	RO
3 Silencer	608 / 609		RO

Notes:

Function: Latch operated by lever either side except when turn button locks outside lever. Pushing turn button inside locks outside lever, requiring use of key outside to unlock. Turning inside lever unlocks outside lever (when button is pushed in but not turned). Pushing in and turning inside button locks outside lever, requiring key at all times. Turning inside lever does not unlock outside lever until button is manually turned to unlocked position. Inside lever always free for egress.

Set: 3.0

Doors: A103

3 Hinge, Full Mortise	TA714 (NRP)	US26D	MK
1 Privacy Lock	CLX3320 PZD	626	RU
1 Surface Closer	7500 - pull side mount	689	NO
1 Kick Plate	K1050 10" high CSK BEV	US32D	RO

1 Wall Stop	RM861	US32D	RO
3 Silencer	608 / 609		RO
1 Coat Hook	796	US26D	RO

Notes: Install coat hook at 48" centerline above floor.

Set: 4.0

Doors: A104

3 Hinge, Full Mortise	TA714 (NRP)	US26D	MK
1 Storeroom Lock	CLX3357 PZD C6 GMK	626	RU
1 Prepare Frame	for HES electric strike model 1006 (provided by Owner)		HS
1 Surface Closer	7500 - pull side mount	689	NO
1 Kick Plate	K1050 10" high CSK BEV	US32D	RO
1 Wall Stop	RM860	US32D	RO
1 Threshold	171A		PE
1 Seals	S773BL - head and jambs		PE
1 Corner Seals	ACP112BL/2		PE
1 Conc. Auto. Door Bottom	STC411APK		PE
1 Door Position Switch	- Provided by Owner		OT
1 Power Supply	- Provided by Owner		OT
1 Card Reader	- Provided by Owner		OT

Notes: Valid use of card reader outside unlocks electric strike to gain access. Key override outside lever retracts latch bolt. Free egress always permitted.

Set: 5.0

Doors: A102, A105a

3 Hinge, Full Mortise	TA714 (NRP)	US26D	MK
1 Storeroom Lock	CLX3357 PZD C6 GMK	626	RU
1 Prepare Frame	for HES electric strike model 1006 (provided by Owner)		HS
1 Surface Closer	2800ST - pull side mount	689	NO
1 Kick Plate	K1050 10" high CSK BEV	US32D	RO
3 Silencer	608 / 609		RO
1 Door Position Switch	- Provided by Owner		OT
1 Power Supply	- Provided by Owner		OT
1 Card Reader	- Provided by Owner		OT

Notes: Valid use of card reader outside unlocks electric strike to gain access. Key override outside lever retracts latch bolt. Free egress always permitted.

Set: 5.1

Doors: A105b

3 Hinge, Full Mortise	TA714 (NRP)	US26D	MK
1 Storeroom Lock	CLX3357 PZD C6 GMK	626	RU
1 Prepare Frame	for HES electric strike model 1006 (provided by Owner)		HS
1 Surface Closer	2800ST - pull side mount	689	NO
1 Kick Plate	K1050 10" high CSK BEV	US32D	RO
1 Threshold	171A		PE
1 Seals	S773BL - head and jambs		PE
1 Corner Seals	ACP112BL/2		PE
1 Conc. Auto. Door Bottom	STC411APK		PE
1 Door Position Switch	- Provided by Owner		OT
1 Power Supply	- Provided by Owner		OT
1 Card Reader	- Provided by Owner		OT

Notes: Valid use of card reader outside unlocks electric strike to gain access. Key override outside lever retracts latch bolt. Free egress always permitted.

Set: 6.0

Doors: A106b

1 Reuse	Existing Door Hardware		OT
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Set: 8.0

Doors: A001

3 Hinge, Full Mortise, Hvy Wt	TA786 x NRP	US26D	MK
1 Fire Rated Rim Exit, Classroom	ED5200A PR955ET M110	630	RU
1 Rim Cylinder	CR3080 x GMK	626	RU
1 Arm Support Bracket	6890	689	NO
1 Surface Closer	PR7500	689	NO
1 Kick Plate	K1050 10" high CSK BEV	US32D	RO
1 Wall Stop	RM860	US32D	RO
1 Smoe / Sound Seal	S88BL - head and jambs		PE

Notes: Key outside locks or unlocks lever trim. Free egress always permitted.

Set: 9.0

Doors: A003, A004

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Center Infill Addition
Bid Documents

Door Hardware

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1 Continuous Hinge	CFM-SLF-HD1		PE
1 Storeroom Lock	CLX3357 PZD C6 GMK	626	RU
1 Surface Closer	CPS7500	689	NO
1 Arm Support Bracket	6890	689	NO
1 Blade Stop Spacer	6891	689	NO
1 Threshold	279x292AFGPK x MSES25SS		PE
1 Weatherstrip	- integral within construction of door and frame assembly		00
1 Sweep	29326CNB x TKSP8		PE
1 Door Position Switch	- Provided by Owner		OT

Notes: Function: Latch bolt operated by key outside or lever inside. Outside lever always rigid. Inside lever always free for egress.

Set: 10.0

Doors: A002, A005

1 Continuous Hinge	CFM-SLF-HD1		PE
1 Rim Exit Device, Nightlatch	ED5200S K157ET M110 M51	630	RU
1 Rim Cylinder	CR3080 x GMK	626	RU
1 Door Pull	RM3311-24 Mtg-Type 12XHD	US32D- 316	RO
1 Surface Closer	CPS7500	689	NO
1 Arm Support Bracket	6890	689	NO
1 Blade Stop Spacer	6891	689	NO
1 Threshold	279x292AFGPK x MSES25SS		PE
1 Weatherstrip	- integral within construction of door and frame assembly		00
1 Sweep	29326CNB x TKSP8		PE
1 Door Position Switch	- Provided by Owner		OT

Notes: Function: Key outside retracts latch bolt. No dogging of push rail. Free egress always permitted.

END OF SECTION

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**SECTION 08 80 00
GLAZING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.
- B. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
- C. Section 08 14 16 - Flush Wood Doors: Glazed lites in doors.
- D. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing furnished as part of storefront assembly.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test 2015.
- C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers 2005 (Reapproved 2019).
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- F. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass 2021.
- G. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials 2020.
- H. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings 2016.
- I. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation 2010.
- J. GANA (GM) - GANA Glazing Manual 2008.
- K. GANA (SM) - GANA Sealant Manual 2008.
- L. GANA (LGRM) - Laminated Glazing Reference Manual 2019.
- M. NFRC 100 - Procedure for Determining Fenestration Product U-factors 2017.
- N. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence 2014, with Errata (2017).
- O. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems 2017.
- P. UL 263 - Standard for Fire Tests of Building Construction and Materials Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting two weeks before starting work of this section; require attendance by each of the affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- D. Samples: Submit two samples 12 by 12 inch in size of glass units.
- E. Certificates: Certify that products meet or exceed specified requirements.
- F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM), GANA (SM), and GANA (LGRM) for glazing installation methods. Maintain one copy on site.
- B. Provide labels showing glass manufacturer's , type of glass, thickness, and quality. Labels shall remain on glass until it has been seen approved by the Architect.
- C. Thermal Performance Properties:
 - 1. Solar Heat Gain Coefficient : $NFCR\ 200 \leq 0.40$.
- D. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.07 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Glass Fabricators:
 - 1. AGC Glass North America www.agcglass.com
 - 2. Cardinal Glass Industries, www.cardinalcorp.com
 - 3. GGI - General Glass International: www.generalglass.com/#sle.
 - 4. Guardian Glass, LLC, www.guardianglass.com
 - 5. JE Berkowitz, LP: www.jeberkowitz.com/#sle.
 - 6. Pilkington North America, www.pilkington.com
 - 7. Standard Bent Glass Corp: www.standardbent.com/#sle.
 - 8. Trulite Glass & Aluminum Solutions, LLC: www.trulite.com/#sle.
 - 9. Viracon, Inc: www.viracon.com/#sle.
 - 10. Vitro Architectural Glass, www.vitroglazing.com
 - 11. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 - 2. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 - 3. Glass thicknesses listed are minimum.
- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
 - 1. In conjunction with vapor retarder and joint sealer materials described in other sections.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
 - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
 - 1. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
 - 2. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.

2.04 INSULATING / EXTERIOR GLASS UNITS

- A. Insulating Glass Units: Types as indicated.
 - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
 - 3. Spacer Color: Black.
 - 4. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
 - b. Color: Black.
 - 5. Purge interpane space with dry air, hermetically sealed.
- B. EG-1: Insulating Glass Units: Vision glass, double glazed.
 - 1. Applications: Exterior glazing unless otherwise indicated.
 - 2. Space between lites filled with argon.
 - 3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Bronze.
 - b. Coating: Low-E (solar control type), on #2 surface.
 - 1) PPG SolarBan 70XL
 - 2) Substitutions; See Section 01 60 00 - Product Requirements
 - 4. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 5. Total Thickness: 1 inch.
 - 6. Thermal Transmittance (U-Value), Winter - Center of Glass: 0.29, nominal.

7. Visible Light Transmittance (VLT): 42 percent, nominal.
 8. Solar Heat Gain Coefficient (SHGC): 28 percent, nominal.
 9. Glazing Method: Dry glazing method, gasket glazing.
- C. EG-2 Insulating Glass Units: Spandrel glazing.
1. Applications: Exterior spandrel glazing unless otherwise indicated.
 2. Space between lites filled with argon.
 3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - a. Tint: Bronze.
 - b. Coating: Same as on vision units, on #2 surface.
 4. Inboard Lite: Fully tempered float glass, 1/4 inch thick.
 - a. Tint: Clear.
 - b. Opacifier: Elastomeric coating, on #4 surface.
 - c. Opacifier Color: To be selected by owner/architect..
 5. Total Thickness: 1 inch.
 6. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.29, nominal.
 7. Glazing Method: Dry glazing method, gasket glazing.

2.05 GLAZING UNITS

- A. G-1 - Monolithic Interior Vision Glazing:
1. Applications: Interior glazing unless otherwise indicated.
 2. Glass Type: Fully tempered float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch, nominal.

2.06 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that the minimum required face and edge clearances are being provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify that sealing between joints of glass framing members has been completed effectively.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 INSTALLATION - PRESSURE GLAZED SYSTEMS

- A. Application - Exterior Glazed: Set glazing infills from exterior side of building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install pressure plates without displacing glazing gasket; exert pressure for full continuous contact.

3.06 FIELD QUALITY CONTROL

- A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- B. Monitor and report installation procedures and unacceptable conditions.

3.07 CLEANING

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- C. Remove non-permanent labels immediately after glazing installation is complete.
- D. Clean glass and adjacent surfaces after sealants are fully cured.
- E. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.08 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

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Division 09

Finishes

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**SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Gypsum sheathing.
- C. Gypsum wallboard.
- D. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 07 25 00 - Weather Barriers: Water-resistive barrier over sheathing.
- C. Section 07 84 00 - Firestopping: Top-of-wall assemblies at fire rated walls.
- D. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
- E. Section 09 22 16 - Non-Structural Metal Framing.
- F. Section 09 91 23 - Interior Painting and Coating

1.03 REFERENCE STANDARDS

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- C. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board 2020.
- D. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing 2017.
- E. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing 2018.
- F. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.
- G. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2021.
- H. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- I. ASTM E413 - Classification for Rating Sound Insulation 2016.
- J. GA-216 - Application and Finishing of Gypsum Panel Products 2016, with Errata.
- K. GA-600 - Fire Resistance Design Manual Sound Control 2021.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
- C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.05 QUALITY ASSURANCE

- A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
- B. Refer to "Recommended Specification on Levels of Gypsum Board Finish" as published by the Gypsum Association (and AWCI/CISCA/PDCA) for finish levels required.
- C. Recommended deflection limit for gypsum board assemblies is L/240.
 - 1. Tile finishes applied to cementitious backer units will require deflection limits of L/360 or less.

1.06 PROJECT CONDITIONS

- A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever is more stringent.
- B. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F. For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F for 48 hours before application and continuously after until dry. Do not exceed 95 deg F when using temporary heat sources.
- C. Ventilation: Ventilate building spaces as required to dry joint treatment materials.
- D. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- E. If the application of gypsum board and gypsum shaft wall liner starts prior to the building being made weather-tight, the gypsum wallboard and/ or shaft wall liner specified shall be changed to glass-mat interior gypsum board and/ or glass mat gypsum shaft wall liner

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
 - 1. See PART 3 for finishing requirements.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC of 50-54 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
 - 1. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 NON-STRUCTURAL METAL FRAMING MATERIALS

- A. Refer to Section 09 22 16 - Non-Structural Metal Stud Framing

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. American Gypsum Company: www.americangypsum.com/#sle.
 - 2. CertainTeed Corporation: www.certainteed.com/#sle.
 - 3. Continental Building Products: www.continental-bp.com/#sle.
 - 4. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
 - 5. Lafarge North America Inc: www.lafargenorthamerica.com.
 - 6. National Gypsum Company: www.nationalgypsum.com/#sle.
 - 7. USG Corporation: www.usg.com/#sle.
 - 8. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold resistant board is required at all locations.
 3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 4. Thickness:
 - a. Ceilings: 5/8 inch.
 - b. Edges: Tapered
 - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
 5. Mold Resistant Paper Faced Products:
 - a. CertainTeed Corporation; ProRoc Brand Moisture & Mold Resistant Gypsum Board.
 - b. Lafarge North America Inc; Mold Defense Drywall.
 - c. National Gypsum Company; Gold Bond Brand XP Gypsum Board.
 - d. Temple-Inland Building Product by Georgia-Pacific, LLC; ComfortGuard Mold Resistant Gypsum Board.
 - e. USG Corporation; Sheetrock Brand Mold Tough Gypsum Panels.
- C. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
1. Application: Exterior sheathing, unless otherwise indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
 4. Core Type: Regular.
 5. Regular Board Thickness: 5/8 inch.
 6. Edges: Square.
- D. Water-Resistive Barrier: As specified in Section 07 25 00.

2.04 GYPSUM WALLBOARD ACCESSORIES

- A. Acoustic Insulation: ASTM C665; friction fit type, unfaced.
1. Refer to Section 07 21 16 Blanket Insulation
- B. Reveal Moldings:
1. Manufacturer: Fry Reglet Corporation, Alpharetta, GA
 - a. Products: A.7 and A.1
 2. Acceptable Manufacturers
 - a. Gordon Inc, Shreveport, LA
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- C. Corner Beads: Zinc alloy. Products shall be similar to the following:
1. Marino-Ware; Product CB Corner Bead: www.marinoware.com.
 2. Phillips Manufacturing Co; Product Everlast Corner Bead: www.phillipsmfg.com.
 3. 103 Deluxe Bead by Clark Dietrich Building Systems
 4. Substitutions: See Section 01 6000- Product Requirements.
- D. Edge Trim: L bead, as defined in ASTM C 840. Products shall be similar to the following:
1. Marino-Ware; Product L Trim: www.marinoware.com.
 2. Phillips Manufacturing Co; Product L-200 Trim: www.phillipsmfg.com.
 3. Clark Dietrich Building Systems Product Metal Trim M20B
 4. Substitutions: See Section 01 6000 - Product Requirements.
- E. Expansion and Control Joints: Galvanized steel one piece with V-shaped slot and removable strip covering opening. Products shall be similar to the following:
1. Phillips Manufacturing Co; Product 093 Expansion Joint: www.phillipsmfg.com.
 2. Clark Dietrich Building Systems; Product 093 Control Joining
 3. by Alabama Metal Industries Corporation (AMICO); Product No. 093 Drywall Control Joint

4. Substitutions: See Section 01 6000 - Product Requirements.
- F. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 1. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 2. Ready-mixed vinyl-based joint compound.
 3. Chemical hardening type compound.
- G. Screws: ASTM C 1002; self-drilling type; cadmium-plated for exterior locations.
- H. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 1. Place one bead continuously on substrate before installation of perimeter framing members.
 2. Place continuous bead at perimeter of each layer of gypsum board.
 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.03 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
 1. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.
- E. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
 1. Provide framing immediately on both sides of joint and back with 2 inches of gypsum board strips to maintain fire resistance rating.
 2. Attach to framing with screws.
 3. Use longest practical lengths.
 4. Not more than 30 feet apart on walls and ceilings over 50 feet long.
 5. Partition, furring or column fireproofing abuts a structural element (except floor) or dissimilar wall or ceiling.
 6. Ceiling abuts a structural element, dissimilar wall or partition or other vertical penetration.
 7. Construction changes within the plane of the partition or ceiling.
 8. Wings of L, U, and T shaped ceiling area are joined.

- B. Corner Beads: Install at external corners, using longest practical lengths.
 - 1. Attach to framing with screws.
- C. Edge Trim (Casing Bead): Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.05 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.
- B. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - 2. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 - 2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.
 - 3. Taping, filling and sanding is not required at base layer of double layer applications.
- E. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.06 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.07 FINISH LEVEL SCHEDULE

- A. Level 1: Above finished ceilings concealed from view.
 - 1. All joints and interior angles shall have tape set in joint compound. Surface is to be free of excess joint compound. Tool marks and ridges acceptable.
- B. Level 2: Utility areas and areas behind cabinetry.
 - 1. All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surfaces shall be free of excess joint compound. Tool marks and ridges acceptable. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound.
- C. Level 3: Walls scheduled to receive textured wall finish.
 - 1. All joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all joints and interior angles. Fasteners heads and accessories shall be covered with two separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges.
- D. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish of wall coverings.
 - 1. All joints and interior angles shall have tape embedded in joint compound and two additional coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fasteners heads and accessories shall be covered with three separate coats of joint compound. The surface shall be smooth and free of tool marks and ridges.
- E. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss paint finish or in areas where severe or critical lighting conditions occur.

1. All joints and interior angles shall have tape embedded in joint compound and two additional coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fasteners heads and accessories shall be covered with three separate coats of joint compound. A thin coat (skim coat) of joint compound or a material manufactured especially for this purpose, shall be applied to the entire surface. The surface shall be smooth and free of tool marks and ridges.
 - a. Skim Coat: a thin coat of joint compound or a material manufactured especially for this purpose, applied over the entire surface to fill imperfections in the joint work. smooth the pater texture, and provide a uniform surface. Excess compound is immediately sheared off, leaving a film of skim coating compound completely covering the paper.

END OF SECTION

**SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal partition, ceiling, and soffit framing.
- B. Framing accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking within stud framing.
- B. Section 07 21 13 - Board Insulation:
- C. Section 07 84 00 - Firestopping: Sealing top-of-wall assemblies at fire rated walls.
- D. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
- E. Section 09 21 16 - Gypsum Board Assemblies: Metal studs for gypsum board partition framing.

1.03 REFERENCE STANDARDS

- A. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members 2018.
- B. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products 2020.
- C. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- D. ASTM E413 - Classification for Rating Sound Insulation 2016.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate anchorage to structure, acoustic details, and items of other related work.
 - 2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement of framing connections.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing, Connectors, and Accessories:
 - 1. CEMCO: www.cemcosteel.com/#sle.
 - 2. ClarkDietrich: www.clarkdietrich.com/#sle.
 - 3. Jaimes Industries: www.jaimesind.com/#sle.
 - 4. Clarkwestern Dietrich Building Systems LLC: www.clarkdeitrich.com.
 - 5. Marino: www.marinoware.com/#sle.
 - 6. R-stud, LLC: www.rstud.com/#sle.
 - 7. SCAFCO Corporation: www.scafco.com/#sle.
 - 8. Simpson Strong Tie: www.strongtie.com/#sle.
 - 9. Steel Construction Systems: www.steelconsystems.com/#sle.
 - 10. The Steel Network, Inc: www.SteelNetwork.com/#sle.
 - 11. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FRAMING MATERIALS

- A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
 - 1. Studs: C shaped with flat or formed webs with knurled faces.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Ceiling Channels: C shaped.
 - 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
 - 5. Gauge: Unless indicated otherwise the metal stud framing shall be formed from the following gauge metal:
 - a. Framing openings: 16 gauge (head and jamb).
 - b. Remaining metal studs: 20 gauge
 - 6. Z Furring: Z- shaped sections, depth to match the thickness of rigid insulation, 20 gauge.
 - 7. Furring: Hat-shaped sections, minimum depth of 7/8 inch 20 gauge.
 - 8. Resilient Sound Isolation Clips: Steel resilient clips with molded rubber isolators, attaches to framing; improves noise isolation for areas between gypsum board assemblies and adjacent sources of noise.
 - 9. Steel Stud Framing Connectors:
- B. Partition Head to Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and braced with continuous bridging on both sides.
- C. Deflection and Firestop Track: Intumescent strip factory-applied to track flanges expands when exposed to heat or flames to provide a perimeter joint seal.
- D. Steel Framing For Suspended Ceilings:
 - 1. Material: Cold rolled steel, 0.0598 inch (16 gauge) minimum thickness of base metal; galvanized in accordance with ASTM A 653, G60 hot dip galvanized coating.
 - 2. Ceiling Channels: C shaped 20 gauge.
 - 3. Carrying Channels: 1-1/2 inches deep with 7/16 inch wide flanges
 - 4. Furring: Hat-shaped sections, depth 7/8 inch, 16 gauge
 - 5. Wire Hangers: ASTM A641, Class 1 zinc coating, soft temper, 0.162 inch (8 gage).
 - 6. Hanger Anchorage Devices: Screws, clips, bolts, cast-in-place concrete inserts or other devices applicable to the indicated method of structural anchorage for ceiling hangers. Size devices for 3 times the calculated load supported, except size direct pullout concrete inserts for 5 times the calculated loads.
 - 7. Channel Bridging and Bracing: U-Channel Assembly; Base metal thickness of .0538 and minimum of 1/2 inch flanges.
 - 8. Flat Strap and Backing Plate: Sheet for blocking and bracing in length and width indicated:
 - a. Galvanized Sheet Steel.
- E. Non-Loadbearing Framing Accessories:
- F. Acoustic Insulation: As specified in Section 07 21 13.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that rough-in utilities are in proper location.

3.02 INSTALLATION OF STUD FRAMING

- A. Extend partition framing to structure where indicated and to ceiling in other locations.
- B. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

- C. Align and secure top and bottom runners at 24 inches on center.
- D. At partitions indicated with an acoustic rating:
 - 1. Provide components and install as required to produce STC rating of 50 - 54, based on published tests by manufacturer conducted in accordance with ASTM E90 with STC rating calculated in accordance with ASTM E413.
 - 2. Place one bead of acoustic sealant between runners and substrate , studs and adjacent construction.
- E. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
- F. Install studs vertically at 16 inches on center.
- G. Align stud web openings horizontally.
- H. Secure studs to tracks using crimping method. Do not weld.
- I. Fabricate corners using a minimum of three studs.
- J. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.
- K. Coordinate erection of studs with requirements of door frames and window frames; install supports and attachments.
- L. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.
- M. Blocking: Use wood blocking secured to studs. Provide blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, and opening frames.
- N. Sound Isolation Clips: Mechanically attach to framing or structure with fasteners recommended by clip manufacturer. Install at spacing indicated on drawings.
- O. Furring: Coordinate with sound isolation clip spacing and locations. Lap splices a minimum of 6 inches.

3.03 CEILING AND SOFFIT FRAMING

- A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.
- B. Install furring independent of walls, columns, and above-ceiling work.
- C. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.
- D. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.
- E. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

3.04 TOLERANCES

END OF SECTION

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**SECTION 09 51 00
ACOUSTICAL CEILINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.

1.02 RELATED REQUIREMENTS

- A. Division 21 - Fire Suppression Sprinklers: Sprinkler heads in ceiling system.
- B. Division 23 - Air Outlets and Inlets: Air diffusion devices in ceiling.
- C. Division 26 - Interior Luminaires: Light fixtures in ceiling system.
- D. Division 27 - Public Address and Music Equipment: Speakers in ceiling system.
- E. Division 28 - Fire Alarm System: Fire alarm components in ceiling system.

1.03 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings 2017.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels 2019.
- C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions 2022.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.

1.06 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.08 EXTRA MATERIALS

- A. See Section 01 60 00 - Product Requirements, for additional provisions.
- B. Maintenance Stock: Provide 1 (one) percent of total acoustical unit area of each type of acoustical unit for Owner's use in maintenance of project. This extra material is NOT to be used for any repair or replacement required during the construction period.
- C. Replacement Stock: In addition to the maintenance stock, provide 1 (one) percent replacement stock of total acoustical unit area of each type of acoustical units. Replacement Stock is to be used to replace damaged materials during a 60 (sixty) day period following Substantial Completion when the responsible party for the damage cannot be determined. Remaining replacement stock is to turn over to the owner.

- D. Obtain Owner's signature acknowledging receipt of extra stock.

PART 2 PRODUCTS

2.01 REFER TO "FINISH MATERIAL SCHEDULE" ON SHEET A9.0 FOR MANUFACTURER INFORMATION AND MATERIAL SELECTIONS. ALSO REFERENCE OTHER A9 SERIES DRAWINGS (FINISH PLANS) FOR ADDITIONAL INFORMATION, LOCATIONS AND EXTENT OF MATERIALS.

2.02 MANUFACTURERS

- A. Acoustic Tiles/Panels:
 - 1. Armstrong World Industries, Inc: www.armstrong.com/#sle.
 - 2. USG Corporation: www.usg.com/#sle.
 - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Suspension Systems:
 - 1. Same as for acoustical units.

2.03 SUSPENSION SYSTEM(S)

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
- B. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
 - 1. Profile: Tee; 15/16 inch wide face.
 - 2. Construction: Double web.
 - 3. Wire: ASTM A641, Class i zinc coating, soft temper 0.162 inch (8 gauge)
 - 4. Finish: White painted, or as noted on A9 - Material Finish Schedule.

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Hanger Wire: 12-gage 0.08 inch galvanized steel wire.
- C. Perimeter Moldings: Same metal and finish as grid.
 - 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
 - 2. At concrete masonry bullnose corners: Provide bullnose corner cover at same elevation as face of grid.
 - 3. Reveal Edge: Provide classic axiom straight trim with nominal 4 inch profile.
 - 4. Vertical Moldings: Provide 'F' molding at top and bottom edges of ceiling tile. Anchor molding to ceiling suspension system.
- D. Hold Down Clips: Compatible with ceiling grid
 - 1. Provide hold down clips within 20 of exterior door
 - 2. Vestibules
 - 3. Toilet Rooms
 - 4. Locker Rooms
 - 5. In other spaces as shown on the drawings.
- E. Rough Suspension Material
 - 1. Metal Channel Runners: 1 1/2 inch and 3/4 inch
 - 2. Hanger Wire: #12 galvanized soft anneal steel or 3/16 diameter thread rod
 - 3. Tie Wire: #18 galvanized anneal steel.
- F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636/C 636M, ASTM C 636/C 636M, and ASTM C 636/C 636M and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
- E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- F. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- G. Hang suspension system from the building structure (structural steel and joist).
 - 1. Do not hang suspension system from metal deck.
 - 2. Do not hang suspension system from joist bridging.
- H. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- I. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- J. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- K. Do not eccentrically load system or induce rotation of runners.
- L. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
 - 2. Overlap corners.

END OF SECTION

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**SECTION 09 65 00
RESILIENT FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient Vinyl tile flooring.
- B. Installation accessories.
- C. Adhesives
- D. Preparation for use (clean and polishing)

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.
- B. Section 05 51 00 - Metal Stairs
- C. Section 09 65 13 - Resilient Base and Accessories
- D. Section 09 68 00 - Carpeting
- E. Section 09 68 13 - Tile Carpeting

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source 2019a, with Editorial Revision (2020).
- B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2021.
- C. ASTM E 662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials; 1995.
- D. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile 2004 (Reapproved 2018).
- E. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting at least two (2) weeks prior to the start of the work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- F. LEED Report: Report recycled content and VOC emission of flooring; VOC content of adhesives.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Flooring Material: 50 square feet of each type and color.

3. Extra Wall Base: 25 linear feet of each type and color.
4. Extra Stair Materials: Quantity equivalent to 5 percent of each type and color.
5. Obtain Owner's signature acknowledging receipt of extra stock.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum Five years documented experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum Five years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- D. Protect roll materials from damage by storing on end.

1.08 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.09 WARRANTY

- A. See Section 01 7800 - 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: 10 years from the date of Substantial Completion

PART 2 PRODUCTS

2.01 REFER TO "FINISH MATERIAL SCHEDULE" ON SHEET A9.0 FOR MANUFACTURER INFORMATION AND MATERIAL SELECTIONS. ALSO REFERENCE OTHER A9 SERIES DRAWINGS (FINISH PLANS) FOR ADDITIONAL INFORMATION, LOCATIONS AND EXTENT OF MATERIALS.

2.02 TILE FLOORING

- A. Vinyl Enhanced Tile (VET):
 1. Minimum Requirements: Comply with ASTM F 1066.
 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
 3. VOC Content: As specified in Section 01 6116.
 4. Size: 12 x 12 inch.
 5. Thickness: 0.125 inch.
 6. Manufacturers: Refer to "Finsh Material Schedule" on drawing A9.0.
 - a. Substitutions: See Section 01 6000 - Product Requirements.
- B. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
 1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

1. Adhesives: Type to allow installation of flooring with a concrete floor slab of up to an RH of 85% as tested by ASTM F 2170 or provide penetrating moisture barrier and compatible adhesive as recommended by the flooring manufacturer.
- C. Moldings, Transition and Edge Strips: Refer to "Finish Material Schedule" on drawing A9.0. Refer to A9 series drawings for more information and further detail drawings for flooring transitions.
- D. Filler for Coved Base: Plastic.
- E. Sealer and Wax:
 1. Commercial grade products recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive resilient flooring.
- C. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- D. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- E. Verify subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.
- F. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Verify that concrete sub-floor surfaces are dry enough and ready for resilient flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710; obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
 1. Base Bid: Verify that concrete sub-floor surfaces are dry enough and ready for resilient flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710; obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
 2. As specified in Section 03 0510 Moisture Vapor Reduction Admixture. No further moisture testing shall be required prior to flooring installation.
- C. Clean substrate by sweeping, washing or other methods to remove any loose material which may show through installed tile.
- D. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive-Applied Installation:
 1. Place copper grounding strip in conductive adhesive and apply additional adhesive to top side of strip before installing static control flooring. Allow strip to extend beyond flooring in accordance with static control flooring manufacturer's instructions. Refer to Section 26 05 26 for grounding and bonding to building grounding system.
 2. Fit joints and butt seams tightly.

- 3. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Spread only enough adhesive to permit installation of materials before initial set.
- E. Fit joints and butt seams tightly.
- F. Set flooring in place, press with heavy roller to attain full adhesion.
- G. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- H. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - 1. Resilient Strips: Attach to substrate using adhesive.
- I. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- J. Install flooring in recessed floor access covers, maintaining floor pattern.
- K. Trowel marks and other imperfections showing through installed tile shall be reason to, remove tile, sand out trowel marks, remove or correct imperfections and reinstall tile.

3.04 INSTALLATION - SHEET FLOORING

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
- B. Double cut sheet at seams.
- C. Lay flooring with tightly butted seams, without any seam sealer unless otherwise indicated.
- D. Double cut sheet; provide heat welded seams.
- E. Coved Base: Install as detailed on drawings, using coved base filler as backing at floor to wall junction. Extend sheet flooring vertically to height indicated, and cover top edge with metal cap strip.

3.05 INSTALLATION - TILE FLOORING

- A. Install in accordance with manufacturer's instructions.
- B. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Set flooring in place, press with heavy roller to attain full adhesion.
- E. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.
- F. Install square tile to ashlar pattern. Allow minimum 1/2 full size tile width at room or area perimeter.
- G. Where floor finishes are different on opposite sides of door, terminate flooring under centerline of door.
- H. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- I. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- J. Install flooring in recessed floor access covers. Maintain floor pattern.
- K. At movable partitions, install flooring under partitions without interrupting floor pattern.

3.06 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Install base on casework base. Bond tightly to casework and floor.
- E. Scribe and fit to door frames and other interruptions.

3.07 INSTALLATION - STAIR COVERINGS

- A. Install stair coverings in one piece for full width and depth of tread.
- B. Install stair landing tile the full width and depth of landing
- C. Adhere over entire surface. Fit accurately and securely.

3.08 CLEANING AND POLISHING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.
- C. Clean, seal, and wax resilient flooring products in accordance with manufacturer's instructions (preparation for commercial traffic).
 - 1. Scrub the floor with a neutral detergent and scrubbing pad
 - 2. Thoroughly rinse floor and allow it to dry.
 - 3. Apply manufacturers recommended amount of wax or polish when floors are complete.

3.09 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.
- B. Contractor is to protect flooring from time of installation to final completion of project.
- C. If flooring protection is damaged, contractor shall replace it to ensure full protection.

END OF SECTION

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**SECTION 09 65 13
RESILIENT BASE & ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDE

- A. Resilient Wall Base
- B. Resilient Stair Treads
- C. Stair Nosings and Risers for Resilient Flooring
- D. Adhesives

1.02 RELATED REQUIREMENTS

- A. Section 05 51 00 - Metal Stairs
- B. Section 09 65 00 - Resilient Flooring
- C. Section 09 68 00 - Carpeting
- D. Section 09 68 13 - Tile Carpeting

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 Owner's use in maintenance of project.
 - 1. Extra Wall Base: 25 linear feet of each type and color.
 - 2. 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 Building 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 REFER TO "FINISH MATERIAL SCHEDULE" ON SHEET A9.0 FOR MANUFACTURER INFORMATION AND MATERIAL SELECTIONS. ALSO REFERENCE OTHER A9 SERIES DRAWINGS (FINISH PLANS) FOR ADDITIONAL INFORMATION, LOCATIONS AND EXTENT OF MATERIALS.

2.02 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.

2.03 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

2.04 RESILIENT STAIR TREADS

- A. Refer to A9, Material Finish Schedule for product information and details.(RST)
- B. Stair Treads: Rubber; full width and depth of stair tread in one piece; tapered thickness.
 1. Manufacturers:
 - a. Burke Flooring; www.burkeflooring.com/#sle.
 - b. Johnsonite, a Tarkett Company;[____]: www.johnsonite.com/#sle.
 - c. Roppe Corp;[____]: www.roppe.com/#sle.
 - d. Substitutions: See Section 01 60 00-Product Requirements.
 2. Minimum Requirements: Comply with ASTM F2169, Type TS, rubber, vulcanized thermoset.
 3. Minimum Requirements: Comply with ASTM F1700, of Class III, Type B.
 4. VOC Content: As specified in Section 01 61 16.
 5. Nominal Thickness: 0.1875 inch.
 6. Nosing: Square.
 - a. Striping: 2 inch wide contrasting color abrasive strips.
 7. Texture: Smooth.
 8. Pattern: [As indicated on drawings].
 9. Color: As indicated on drawings.
- C. Rubber Stair Landing Tiles: Include landing tiles to match the pattern and thickness of the stair treads.
 1. Manufacturers:
 - a. Match Rubber Stair Treads

2.05 RESILIENT STAIR NOSING AT STAGE OPENING (PK-1)

- A. Refer to A9.0, Material Finish Schedule for product information and details. (FLT4)
- B. Stair Nosing: Curved Profile

2.06 RESILIENT STAIR NOSING AND RISER TRIM AT STAGE STAIR (5-6)

- A. Refer to A9.0, Material Finish Schedule for product information and details. (RSN)
- B. Stair Nosing: Metal Trim to protect edges of resilient flooring installed on outside corner tread and risers

- C. Stair Riser Trim: Metal Trim to create cove joint between resilient flooring at insider corner of tread and risers.
 - 1. Manufacturers:
 - a. Powerhold
 - b. Schluter Systems
 - c. Tarkett
 - d. Substitutions: See Section 01 60 00-Product Requirements.

2.07 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 68 13
TILE CARPETING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered.
- B. Accessories

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied flooring.
- B. Section 09 6500 - Resilient Flooring: Base finish.

1.03 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2021.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Shop Drawings: Indicate layout of joints, direction of carpet pile, and location of edge moldings.
- D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: 30 tiles of each color and pattern installed.
 - 3. Obtain Owner's signature acknowledging receipt of extra stock.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Carpet shall meet or exceed Carpet and Rug Institutes (CRI) Appearance Retention Rating of 3.5 ARR.
- C. Products comply with requirements of CRI's Green Label Indoor Air Quality Testing Program.
- D. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.
- B. Maintain minimum 70 degrees F ambient temperature 24 hours prior to, during and 24 hours after installation.
- C. Concrete subfloors must meet the following requirements before carpet may be installed:
 - 1. Comply with manufacturers moisture requirements
 - 2. pH range of 5 to 9
 - 3. Moisture-emission rate of 3 lb/1000 sq ft per 24 hours or less.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

- B. Backing: Provide 10 year or greater manufacturer's warranty against fiber abrasive wear, fiber static protection, backing (tuftbind/zippering, integrity/dimensional stability), and edge ravel.
- C. Moisture Vapor Reduction Admixture: Manufacturer of flooring material and associated adhesives shall convey standard product warranty with the use of concrete moisture vapor reduction admixture.

PART 2 PRODUCTS

2.01 REFER TO "FINISH MATERIAL SCHEDULE" ON SHEET A9.0 FOR MANUFACTURER INFORMATION AND MATERIAL SELECTIONS. ALSO REFERENCE OTHER A9 SERIES DRAWINGS (FINISH PLANS) FOR ADDITIONAL INFORMATION, LOCATIONS AND EXTENT OF MATERIALS.

2.02 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Adhesives:
 - 1. Recommended by carpet manufacturer.
 - 2. Type to allow installation of flooring with a concrete floor slab of up to an RH of 85% as tested by ASTM F 2170 or provide penetrating moisture barrier and compatible adhesive as recommended by the flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- C. Verify that concrete sub-floor and self leveling underlayment surfaces are dry enough and ready for flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710; obtain instructions if test results are not within limits recommended by carpet tile manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- 1. Perform test recommended by manufacturer, following adhesive manufacturer's application instructions for use on non-porous substrates.
- B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. Vacuum clean substrate.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in pattern as directed by the Architect
- F. Trim carpet tile neatly at walls and around interruptions.
- G. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

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**SECTION 09 69 00
ACCESS FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Raised access flooring systems.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - VOC CONTENT RESTRICTIONS.
- B. Section 21 13 00 - Fire Protection Systems: Underfloor fire extinguishing system.
- C. Section 23 33 00 - Air Duct Accessories: Fire dampers for use in space below access flooring system.
- D. Section 23 81 25 - Computer Room Air Conditioners.
- E. Section 26 27 26 - WIRING DEVICES: Access floor boxes.
- F. Section 28 46 00 - Fire Detection and Alarm: Underfloor smoke detection system.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- D. CISCA (AF) - Recommended Test Procedures for Access Floors 2016.
- E. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- G. ICC-ES AC151 - Acceptance Criteria for Fixed-height, Low-profile, Raised Floor Systems 2007.
- H. ICC-ES AC300 - Acceptance Criteria for Access Floors 2010, with Editorial Revision (2014).
- I. NFPA 75 - Standard for the Fire Protection of Information Technology Equipment 2020.

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. Product Data: Provide manufacturer's data sheets including loading capacities, materials, finishes, dimensions of components, profiles, and accessories.
- C. Shop Drawings: Indicate floor layout, appurtenances or interruptions, edge details, and ramps.
- D. Samples: Submit two samples of floor grid and panel, 12 by 12 inch in size illustrating finish.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Materials: Supply an additional 5 (five) percent of access flooring system components.
 - 3. Panel Lifting Devices: One, of manufacturer's standard type.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work required in this section and approved by access flooring manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Access Flooring
 - 1. ASM Modular Systems, Inc; [____]: www.asmproducts.com/#sle.
 - 2. Global IFS; [____]: www.globalIFS.com/#sle.
 - 3. Tate Access Floors, Inc; [____]: www.tateaccessfloors.com/#sle.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. General: Comply with the following system requirements and as indicated for specified components.
 - 1. Test in accordance with CISCA (AF).
 - 2. Comply with requirements of NFPA 75.
 - 3. Comply with requirements of ICC-ES AC300.
 - 4. Comply with requirements of ICC-ES AC151.
 - 5. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 6. Structural Design Live Loads: Comply with requirements of ICC (IBC).
 - a. Uniformly Distributed Loads: In compliance with ICC (IBC) Table 1607.1, for access floor systems.
 - 1) Computer Use: 100 pounds per sq ft.
 - b. Concentrated Loads: Over an area of 2.5 feet by 2.5 feet, 2000 pounds minimum, in compliance with ICC (IBC) Table 1607.1, for access floor systems.
 - 7. Seismic Performance: Access flooring designed to withstand effects of earthquake motions determined according to ASCE 7.
 - 8. Lateral Stability: Design system for lateral stability in all directions, with or without panels in place.

2.03 RAISED ACCESS FLOORING

- A. Factory-fabricated system consisting of removable floor panels and supporting understructure that allows access to space below floor without requiring removal of panels other than the one directly above the space to which access is needed; provide components and accessories required for complete installation.
- B. Configuration:
 - 1. Lay-in panels on bolted stringer understructure.
- C. Components:
 - 1. Pedestal Assembly:
 - a. Material: Steel.
 - b. Base: Manufacturer's standard shape and size in accordance with system performance requirements.
 - c. Column: Threaded supporting rod to permit 1-1/2 inch adjustment.
 - 2. Stringers: Steel channels, box, or tee sections.
 - 3. Floor Panels:
 - a. Construction:
 - 1) Concrete core laminated with sheet steel plates with epoxy paint finish
 - b. Factory-Applied Finish: Formica 3518-58 Flint Crystall

2.04 ACCESSORIES - ADJUSTABLE HEIGHT

2.05 FABRICATION

- A. Fabrication Tolerances:
 - 1. Floor Panel Flatness: Plus or minus 0.02 inch in any direction.
 - 2. Floor Panel Width or Length From Specified Size: Plus or minus 0.02 inch.
 - 3. Floor Panel Squareness: Plus or minus 0.03 inch difference between opposite diagonal dimensions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements are as indicated on shop drawings.
- B. Verify that substrates comply with tolerances, dimensioned clearances, and other requirements specified in other sections, and that substrates are clean, dry, and free of conditions and deleterious substances that might interfere with system installation.
- C. Verify that required utilities are available, in proper location, and are ready for use.
- D. Start of installation constitutes acceptance of project conditions.

3.02 PREPARATION

- A. Vacuum clean substrate surfaces.

3.03 INSTALLATION

- A. Install components in accordance with manufacturer's instructions.
- B. Secure pedestal base plate to subfloor with metal fasteners.
- C. Close field cut floor panels with edge trim.

3.04 ADJUSTING

- A. Adjust pedestals to achieve a level floor and to assure adjacent floor panel surfaces are flush.

3.05 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. Demonstration and Training:
 - 1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain access flooring system.
 - 2. Location: At project site.

3.06 PROTECTION

- A. Do not permit traffic over unprotected floor surface.

END OF SECTION

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**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, including the following:
- 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 05 50 00 - Metal Fabrications: Shop-primed items.
- B. Section 09 91 23 - Interior Painting.
- C. Section 09 96 00 - High-Performance Coatings.

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. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- D. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- E. SSPC-SP 2 - Hand Tool Cleaning 2018.
- F. SSPC-SP 6 - Commercial Blast Cleaning 2007.
- G. 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. Samples: Submit three paper samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.

2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.
 3. Allow 30 days for approval process, after receipt of complete samples by Architect.
- D. 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.
- E. Maintenance Materials: Furnish the following for Owner'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 REFER TO "FINISH MATERIAL SCHEDULE" ON SHEET A9.0 FOR MANUFACTURER INFORMATION AND MATERIAL SELECTIONS. ALSO REFERENCE OTHER A9 SERIES DRAWINGS (FINISH PLANS) FOR ADDITIONAL INFORMATION, LOCATIONS, AND EXTENT OF MATERIALS.

2.02 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.

2.03 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. Volatile Organic Compound (VOC) Content:
 - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

2.04 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including concrete masonry units 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 Acri-Shield Max Exterior Latex, 739-10 Series, Satin.
 - 3) Rodda Protector Satin, 532201. (MPI #15)
 - 4) Sherwin-Williams Resilience, Satin. (MPI #15)
 - 3. Top Coat(s): Exterior Light Industrial Coating, Water Based; MPI #161, 163, or 164.
 - a. Products:
 - 1) Behr Premium Interior/Exterior Direct-To-Metal Paint Gloss [No. 8200]. (MPI #164)
 - 2) PPG Paints Pitt-Tech Plus DTM Industrial Enamel, 90-1310 Series, Gloss.
- B. Paint ME-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
 - 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
 - 2. Semi-gloss: Two coats of latex enamel.

2.05 PRIMERS

- A. Primers: Provide the primer as required or recommended by manufacturer of top coats.

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. 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.

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. 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 using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

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.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. 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

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**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. Elevator pit ladders.
 - 3. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
- 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 05 50 00 - Metal Fabrications: Shop-primed items.
- B. Section 05 51 00 - Metal Stairs: Shop-primed items.
- C. Section 09 91 13 - Exterior Painting.
- D. Section 09 96 00 - High-Performance Coatings.

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 (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- D. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- E. 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 Owner'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. Volatile Organic Compound (VOC) Content:
1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. USGBC LEED Rating System; for interior wall and ceiling finish (all coats), anti-corrosive paints on interior ferrous metal, sanding sealers, other sealers, and floor coatings.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. 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

- A. **REFER TO "FINISH MATERIAL SCHEDULE" ON SHEET A9.0 FOR MANUFACTURER INFORMATION AND MATERIAL SELECTIONS. ALSO REFERENCE OTHER A9 and A10 SERIES DRAWINGS (FINISH PLANS) FOR ADDITIONAL INFORMATION, LOCATIONS AND EXTENT OF MATERIALS.**

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 unl
 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. Gypsum Wallboard: 12 percent.
 2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 3. 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. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- G. Galvanized Surfaces:
- 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. Re-prime entire shop-primed item.
 - 3. Remove rust, loose mill scale, and other foreign substances using 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. 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.
- J. 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.
- K. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.

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. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

Division 10

Specialties

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**SECTION 10 14 67
TACTILE SIGNAGE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Restroom Signs

1.02 RELATED SECTIONS

- A. Section 01 60 00 - Products Requirements

1.03 REFERENCES

- A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible To and Usable By Physically Handicapped People.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- D. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to OBBC code and ANSI A117.1 for requirements for the physically handicapped.
- B. Signage shall conform to with the Americans with Disabilities Act Accessibility Guidelines (ADAAG). These requirements supersede Technical Specifications in this Section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 6000 - Product Requirements.
- B. Store adhesive attachment tape at ambient room temperatures.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Do not install signs when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 RESTROOM SIGNS

- A. Manufacturer/Supplier:
 - 1. Compliance Signs.com
 - 2. Substitutions: See Section 01 60 00 - Products Requirements

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 GENERAL INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install signs and letters level and plumb.

- C. Install product in locations indicated using mounting methods recommended by sign manufacturer and free from distortion, warp, or defect adversely affecting appearance
- D. Install product at heights to conform to Americans with Disabilities Act Accessibility Guidelines (ADAAG) and applicable local amendments and regulations.

3.03 CLEANING AND PROTECTION

- A. Clean exposed surfaces. Remove construction and installation marks.
- B. Remove temporary coverings.
- C. Protect installed signs from subsequent construction operations.

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. Grab bars.
- D. Installation of accessories supplied by owner.

1.02 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.

1.03 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.

1.04 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 Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Keys: Master keys to lockable accessories

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. 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 Owner; 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.

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 (Furnished by Owner, Contractor installed)
 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. TA6.1 Paper Towel Dispenser: (Furnished by Owner, Contractor installed)

1. Surface-mounted roll-paper-towel dispenser with durable, high-impact, dark translucent grey resin door with high-gloss finish on exposed surfaces and durable, high-impact, light grey resin housing with matte finish. Door shall be secured to housing with two stainless steel hinge pins and keyed lock. Door shall have lock which is opened with removable key.
2. Towel mechanism accommodates up to 8" (205mm) wide, 8" (205mm) diameter, non-perforated paper towel rolls. Towel mechanism dispenses one 12" (305mm) length of towel per pull. Automatic transfer shall dispense stub roll up to 3-1/2" (90mm) diameter before new roll is dispensed. Equipped with paper towel feed wheel for use in filling the dispenser, for user to advance paper.
3. Paper towels are dispensed with pull force of less than 5 pounds (22.2 N) to comply with accessible design guidelines (including ADAAG in U.S.A.).
4. Product: B-72860 manufactured by Bobrick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on drawings.
- D. 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 A0.2 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

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**SECTION 10 44 00
FIRE PROTECTION SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry
- B. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

- A. FM (AG) - FM Approval Guide current edition.
- B. NFPA 10 - Standard for Portable Fire Extinguishers 2022.
- C. UL (DIR) - Online Certifications Directory Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- C. Product Data: Provide extinguisher operational features.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

1.05 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers:
 - 1. JL Industries, Inc: www.jlindustries.com.
 - 2. Larsen's Manufacturing Co: www.larsensmfg.com.
 - 3. Potter-Roemer: www.potterroemer.com.
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Fire Extinguisher Cabinets and Accessories:
 - 1. JL Industries, Inc: www.jlindustries.com.
 - 2. Larsen's Manufacturing Co: www.larsensmfg.com/#sle.
 - 3. Potter-Roemer: www.potterroemer.com/#sle.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
 - 1. Cartridge Operated: Spun shell.
 - 2. Stored Pressure Operated: Deep Drawn.
 - 3. Class: A:B:C type.
 - 4. Size: 10 pound.

5. Finish: Baked polyester powder coat red color.
6. Temperature range: -65 degrees F to 120 degrees F.
7. Location: All locations unless otherwise indicated

2.03 FIRE EXTINGUISHER CABINETS

- A. Fire Extinguisher Cabinet, Product 2409-R6 Larsen Manufacturing Co., Architectural Series, Steel cabinet, Semi Recessed with 2 1/2 inch projection, Vertical Duo Panel with frame door with tempered glass.
- B. Accessibility: Cabinet, door and accessories to ADA compliant.
- C. Metal: Formed steel.
- D. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- E. Finish of Cabinet Exterior Trim and Door: No. 4 - Brushed stainless steel.
- F. Finish of Cabinet Interior: White colored enamel.

2.04 ACCESSORIES

- A. Cabinet Signage: "Fire Extinguisher" decal in black letters.
 1. Provide signage on front of cabinet
 2. Provide signage on side of cabinet (semi recessed and surface mounted) with a cabinet exposure of 2 1/2 inches or greater.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install brackets on walls. Reference drawings for mounting heights and also coordinate with requirements on authorities having jurisdiction.
- C. Install cabinets plumb and level in wall openings. Reference details on drawings and coordinate with requirements of authorities having jurisdiction to confirm mounting heights and cabinet locations.
- D. Secure rigidly in place.
- E. Place extinguishers in cabinets and on wall brackets.

3.03 ADJUSTMENT

- A. Adjust cabinet doors to achieve smooth operation.

3.04 CLEANING

- A. Clean all surfaces.
- B. Upon completion, remove surplus and excess materials, rubbish, tools and equipment.

3.05 PROTECTION

- A. Protect installed products from damage during construction in accordance.

END OF SECTION

Division 12

Furnishings

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**SECTION 12 24 00
WINDOW SHADES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior manual roller shades.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

1.03 PRICE AND PAYMENT PROCEDURES

- A. See Section 01 23 00 - Alternates, for product alternatives affecting this section.

1.04 REFERENCE STANDARDS

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Sequencing:
 - 1. Do not fabricate shades until field dimensions for each opening have been taken with field conditions in place.
 - 2. Do not install shades until final surface finishes and painting are complete.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
- C. Shop Drawings: Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.
- D. Selection Samples: Include fabric samples in full range of available colors and patterns.
- E. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of shop drawings.
- F. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum 5 years of documented experience with shading systems of similar size and type.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.
- B. Handle and store shades in accordance with manufacturer's recommendations.

1.09 FIELD CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's warranty from Date of Substantial Completion, covering the following:
 - 1. Shade Hardware: One year.

2. Fabric: One year.
3. Aluminum and Steel Coatings: One year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Interior Manually Operated Roller Shades:
 1. Draper, Inc; Clutch Operated FlexShade: www.draperinc.com/
 2. Hunter Douglas Architectural; RB500 Manual Roller Shades: www.hunterdouglasarchitectural.com/
 3. MechoShade Systems LLC; Mecho/5 System: www.mechoshade.com/
 4. SWFcontract, a division of Springs Window Fashions, LLC.; []:
www.swfcontract.com/
 5. Legrand Commercial Shading Solutions; Model TS-Manual: www.legrand.us/
 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 ROLLER SHADES

- A. General:
 1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
 2. Provide shade system that operates smoothly when shades are raised or lowered.
- B. Interior Roller Shades - Basis of Design: Draper, Inc; Clutch Operated FlexShade: www.draperinc.com/
 1. Description: Single roller, manually operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and other components necessary for complete installation.
 - a. Drop Position: Regular roll.
 - b. Mounting: Window jamb mounted - inside, between jambs.
 - c. Fabric: As indicated on drawings.
 2. Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
 - a. Hardware Type: Universal brackets.
 3. Roller Tubes: As required for type of shade operation; designed for removal without removing mounting hardware.
 - a. Material: Extruded aluminum or steel, with wall thickness and material selected by manufacturer.
 - b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
 - c. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.
 4. Hembars: Designed to maintain bottom of shade straight and flat, selected from manufacturer's standard options.
 - a. Style: Closed pocket; aluminum elliptical slat inside pocket with heat-sealed ends.
 5. Manual Operation:
 - a. Clutch Operator: Manufacturer's standard material and design, permanently lubricated.
 - b. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 pounds minimum breaking strength. Provide upper and lower limit stops.
 - c. Chain Retainer:
 - 1) Manufacturer's standard clip.
 6. Accessories:

- a. Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to mounting end caps, without exposed fasteners; clear anodized finish.
- b. End Cap Covers: Match fascia or headbox finish.
- c. Fasteners: Noncorrosive, and as recommended by shade manufacturer.

2.03 ROLLER SHADE FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
 - 1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window stool.
 - 2. Horizontal Dimensions - Inside Mounting: Fill openings from jamb to jamb.
- C. At openings requiring continuous multiple shade units with separate rollers, locate roller joints at window mullion centers; butt rollers end-to-end.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine finished openings for deficiencies that may preclude satisfactory installation.
- B. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

- A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.
- B. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
- B. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.04 CLEANING

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.

3.05 CLOSEOUT ACTIVITIES

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. See Section 01 79 00 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate operation and maintenance of window shade system to Owner's personnel.

3.06 PROTECTION

- A. Protect installed products from subsequent construction operations.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

3.07 MAINTENANCE

- A. See Section 01 70 00 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

END OF SECTION

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**SECTION 12 36 00
COUNTERTOPS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Countertops for architectural cabinet work.

1.02 RELATED REQUIREMENTS

- A. Section 06 41 00 - Architectural Wood Casework.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard 2016.
- B. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications 2016.
- C. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position 2018.
- D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- E. ISFA 2-01 - Classification and Standards for Solid Surfacing Material 2013.
- F. PS 1 - Structural Plywood 2009 (Revised 2019).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- C. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Natural Stone Institute (NSI) Accredited Natural Stone Fabricator; www.naturalstoneinstitute.org/#sle.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than Five years of documented experience.
- C. Quality Certification:
 - 1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
 - 2. Provide designated labels on shop drawings as required by certification program.
 - 3. Provide designated labels on installed products as required by certification program.
 - 4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
 - 5. Replace, repair, or rework all work for which certification is refused.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

- A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Manufacturers:
 - 1) Dupont: www.corian.com/#sle.
 - 2) Formica Corporation: www.formica.com/#sle.
 - 3) Wilsonart: www.wilsonart.com/#sle.
 - b. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
 - c. Color and Pattern: As indicated on Sheet A9.0 Material Finish Schedule
 - 2. Exposed Edge Treatment: Built up to a minimum 1 inch thick; square edge.
 - 3. Fabricate in accordance with manufacturer's standard requirements.

2.02 MATERIALS

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

2.03 FABRICATION

- A. Fabricate tops in the largest sections practicable, with top surface of joints flush.
 - 1. Join lengths of tops using best method recommended by manufacturer.
 - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
- B. Solid Surfacing: Fabricate tops and wall panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Seal joint between countertop and vertical surfaces.

3.04 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

- A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

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Division 21

Fire Suppression

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**SECTION 21 05 01
FIRE PROTECTION 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 section 01 6000 - Product Requirements
- C. Refer to Division 26, Electrical Specifications, and to the requirements stated therein applicable to the Mechanical Work, where coordination of trades is covered.
- D. 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.
- E. 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.
 - 1. The owner will pay for the approval as required by the Ohio Basic Building Code. The Sprinkler contractor shall submit hydraulic calculations and drawings to the architect/engineer for state approval. Three sets required for state approval. The contractor shall secure and pay for all other building permits and governmental fees, licenses and inspections.
- 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 Specified Elsewhere
 - 1. Firestopping is Work of this Section though fire barrier sealants (firestopping) for walls and floors are specified in Section 07 8400. Contractors are responsible for proper sizing of their sleeves and core-drilled holes so that they are at least 1-1/2 inches larger in diameter than the penetrating items. Schedule 40 steel sleeves and core-drilled holes made excessively large or made and not used, will be firestopped and charged to the Contractor who was responsible.
- F. Related Work by Others
 - 1. All electrical wiring, and fire alarm wiring to be done under Division 26, Electrical.
- 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. AGA American Gas Association
 - 2. ANSI American National Standards Institute
 - 3. ASHRAE American Society of Heating, Refrigeration, and
 - 4. Air Conditioning Engineers
 - 5. ASME American Society of Mechanical Engineers
 - 6. AWS American Welding Society
 - 7. AWWA American Water Works Association
 - 8. CISPI Cast Iron Soil Pipe Institute
 - 9. NFPA National Fire Protection Association
 - 10. OSHA Occupational Safety and Health Act
 - 11. SMACNA Sheet Metal and Air Conditioning Contractors National Association
 - 12. 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. NFPA 70 - National Electrical Code; National Fire Protection Association; 1999 applicable requirements.
 3. National Board of Fire Underwriters
 4. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 1993 (and Revision 1,2,3).
 5. Other Codes and Standards as specifically noted in each Section of the Specifications.
 6. 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, hydraulic calculations, 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.
 2. Electronic drawing files can be obtained from Garmann/Miller & Associates Inc.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner'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 Standards.
- 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.
- H. Pressure piping systems installed shall conform to the requirements of the State piping and welding codes where applicable.

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 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.
- E. The fire protection contractor shall not install any piping, ductwork, equipment supported from the structure, conduit, etc. in the mechanical or electrical rooms until all walls and roof structure has been painted.

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.

1.09 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

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. 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. 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.
- C. 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 insulated piping passes through fire barriers, stop insulation at barrier for fire barrier penetration seal.
 9. Where piping passes through nonfire rated, or nonwaterproof, partitions, floors, and walls, apply pipe insulation continuous through pipe sleeves.
 10. Do not install sleeves through suspended ceilings.
 11. Caulk nonfire rated sleeves with sealant.
- 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 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.
- E. 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 CONCRETE HOUSEKEEPING PADS

- A. Contractor shall refer to Specification Section 03 3000 for requirements of concrete housekeeping pads.

3.03 TESTING AND REPAIR

- A. Upon completion of each respective piping system, but prior to insulating, covering, or backfilling, each system shall be thoroughly cleaned and flushed to remove construction dirt and foreign matter.
- B. Test Piping as Specified Herein
1. No piping work shall be concealed or covered until it has been inspected and approved by the project inspector, who shall be notified when the Work is ready for inspection. Work shall be completely installed and tested as required by this Contract and Ordinances of the local Municipality and shall be leaktight to the satisfaction of those making the inspection and the Architect/ Engineer.
 2. In general, pressure tests shall be applied to piping. In no case shall piping be subject to pressure exceeding its rating. Defective work shall be promptly repaired or replaced and test shall be repeated until the particular system and component parts thereof receive approval of the Architect/Engineer.

3. Provide temporary equipment for testing, including pump, blower, and gauges. Test piping system before insulation is installed and remove control devices before testing. Test each natural section of each piping system independently, but do not use piping system valves or to isolate sections where test pressure exceeds valve pressure rating.
 4. Repair piping system sections which fail required piping test by disassembly and reinstallation, using new materials to extent required to overcome leakage. Do not use chemicals, stopleak compounds, mastics, or other temporary repair methods.
 5. Drain test water from piping systems after testing and repair work has been completed.
 6. Pressure for Testing of Piping Systems shall be as follows:
 - a. Fire Protection Piping System (Interior)
 - 1) Per NFPA #13, state and local codes.
 7. Accurately record and report methods of testing, times, and dates of test, witnesses to the test, and the results of the test. Test reports shall be neatly typewritten on standard 8-1/2 inch by 11 inch sheets and submitted in 5 copies to Architect/Engineer for approval within 5 days after test has been performed.
- C. Damage resulting from tests shall be repaired or damaged materials replaced, to satisfaction of Architect/Engineer, and at no cost to Owner.

3.04 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.

3.05 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.

3.06 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 fire protection system and demonstrate their operation and maintenance to the owner's representative.
 1. All demonstrations and training shall be video-taped by the Fire Protection Contractor. Two copies shall be turned over to the owner's representative.

3.07 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.
 - e. A copy of the drawings and calculations.
4. Maintenance and operating manuals, instructions and calculations 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.

3.08 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. 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 21 05 03
WORK IN EXISTING BUILDING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cutting and patching of existing material
- B. Protection of existing conditions
- C. Demolition work
- D. Existing facility operation

1.02 RELATED SECTIONS

- A. Section 02 4100 - Demolition
- B. Section 21 0501 - Fire Suppression Materials and Methods
- C. Section 21 1300 - Fire Protection Systems

1.03 QUALITY ASSURANCE

- A. This Contractor shall be responsible for cutting and patching of existing walls, roofs, floors, and ceilings required for the installation of new plumbing work. Openings shall be neatly drilled or cut.
- B. Patching shall be performed by a workman skilled in the trade involved, and patch work shall match the existing surface and finished in a manner completely acceptable to the Architect.
- C. New Work in finished spaces of existing buildings shall be installed concealed unless directed by Architect/Engineer to run exposed.
- D. Contractor shall visit the Project and verify existing conditions prior to bidding.
- E. Protect existing work, equipment, fixtures, and systems from damage.
- F. Contractor shall take necessary steps to protect the building and all interior finishes from damage during the installation of his work.
- G. The Contractor(s) shall perform demolition work as shown on the Drawings and as specified herein or as may otherwise be required.
 - 1. Plumbing items to be removed shall be as indicated on drawings.
 - 2. The Owner may select items of equipment and material he wishes to retain and these items shall be moved to the location he designates. Other items shall be removed from the premises. Contractor shall verify with owner before any equipment is removed from the premises.
- H. The continuity of operation of existing facilities during construction of the new Work shall be required. The actual length of time for an interruption shall be held to an absolute minimum. At least 48 hours in advance of an installation of new services, submit a specific plan to the Engineer and the Owner detailing the nature and estimated duration of the interruption and the method of procedure. Do not proceed with an interruption of service without the Owner's authorization.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Not Applicable.

PART 3 EXECUTION

3.01 CLEANING

- A. The contractors shall clean all areas of debris and items to be disposed of in all areas where work is performed under each contract.

END OF SECTION

**SECTION 21 05 53
FIRE SUPPRESSION IDENTIFICATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Riser Tags.
- D. Pipe markers.
- E. Ceiling tacks.

1.02 RELATED REQUIREMENTS

- A. Section 09 91 23 - Interior Painting: Stencil paint.

1.03 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems 2020.

1.04 SUBMITTALS

- A. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and installation instructions.
- E. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Champion America, Inc: www.Champion-America.com.
- C. Seton Identification Products: www.seton.com/aec.
- D. Fire Protection Products, Inc.: www.fppi.com
- E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Black.

2.03 TAGS

- A. Metal Tags: Brass with Stamped letters; letters to be filled with black ink; tag size minimum 1-1/2 inch diameter with smooth edges.
- B. Chart: Typewritten letter size list in anodized aluminum frame. Five copies (or sets) of valve tag charts of valves shall be furnished; said charts shall include the following items:
 - 1. Valve Identification
 - 2. Locations
 - 3. Purpose
- C. 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 RISER TAGS

- A. Provide a tag at each Fire Protection Riser.
- B. Plastic Nameplate: Laminated three-layer plastic or aluminum with engraved letters.
 - 1. Color: Red with white lettering.
- C. Mounting: Mount on wall directly behind each riser or hang from easy riser check valve with chain.
- D. Information on tag: Fire protection zone being served by riser, tested flow rate, tested pressure drop at flow rate.

2.05 PIPE MARKERS

- A. Color: 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.

2.06 CEILING TACKS

- A. Description: Steel with 3/4 inch diameter colored, pressure-sensitive adhesive paper circles. Apply circles to ceiling grid below location of system equipment per following code.
- B. Color code as follows:
 - 1. Sprinkler Valves: Orange.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 91 23 for stencil painting.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Identify valves in main and branch piping with tags.
- G. Mount Riser tags on wall directly behind respective riser or hang from riser with chain.
- H. Install Fire Protection Riser Room Sign on exterior side of mechanical room exterior door. Secure with water resistant adhesive glue.
- 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. 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.

- J. Locate ceiling tacks to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

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**SECTION 21 13 00
FIRE PROTECTION SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wet-pipe sprinkler system.
- B. Indicator Valves
- C. System design, installation, and certification.
- D. Fire department connections
- E. Standpipe / Hose Cabinets
- F. Double Check Detector Check Assembly
- G. Reduced Pressure Zone Assembly
- H. Pipe, fittings, valves, and connections for sprinkler, standpipe, and fire hose connections.

1.02 RELATED REQUIREMENTS

- A. Section 21 0501 - Fire Suppression Materials and Methods
- B. Section 21 0503 - Work in Existing Building
- C. Section 21 05 48 - Vibration and Seismic Control.
- D. Section 21 05 53 - Fire Suppression Identification.
- E. Section 21 30 00 - Fire Pumps.

1.03 REFERENCE STANDARDS

- A. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Prevention Assemblies 2021.
- B. ASSE 1015 - Performance Requirements for Double Check Backflow Prevention Assemblies 2021.
- C. ASSE 1047 - Performance Requirements for Reduced Pressure Detector Backflow Prevention Assemblies 2021.
- D. ASSE 1048 - Performance Requirements for Double Check Detector Backflow Prevention Assemblies 2021.
- E. Comply with state and Local Fire Codes
- F. FM (AG) - FM Approval Guide; Factory Mutual Research Corporation; current edition.
- G. ITS (DIR) - Directory of Listed Products Current Edition.
- H. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL (DIR) - Online Certifications Directory Current Edition.
- J. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped Zinc-Coated, Welded and Seamless.
- K. ASTM A 795 - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection use.
- L. UL 312 - Check Valves for Fire Protection Service; Underwriters Laboratories, Inc.
- M. Comply with Factory Mutual Global "Approval Guide".
- N. ASTM A234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel.
- O. ASTM A536 - Standard Specification for Ductile Iron Castings.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Shop Drawings:
 - 1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
 - 2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
 - 3. The owner will pay for the approval as required by the Ohio Basic Building Code with the sprinkler contractor submitting hydraulic calculations and drawings to the architect/engineer for state plan approval. The contractor shall secure and pay for all other building permits and governmental fees, licenses and inspections.
 - 4. Grooved joint couplings and fittings shall be shown on drawings and product submittals, and be specifically identified with applicable Victaulic style number.
 - 5. Sprinkler heads shall be referred to on drawings, submittals, and other documentation, by the sprinkler identification or Model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be allowed.
- D. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.
- E. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds specified requirements and code requirements.
- F. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
 - 2. Extra Sprinklers: Type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
 - 3. Sprinkler Wrenches: For each sprinkler type.

1.05 QUALITY ASSURANCE

- A. Conform to UL and FM requirements.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- C. Equipment and Components: Provide products that bear UL and FM label or marking. Provide manufacturer's name and pressure rating marked on valve body.
- D. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.
- E. Piping shall be installed per NFPA 13, state and local fire codes.
- F. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer.
- G. Testing of piping shall be per NFPA 13.
- H. Sprinkler heads shall be UL and FM labeled and shall be located on spacing requirements as noted in NFPA 13 according to the hazard designation. Extended coverage sprinkler heads are acceptable.

- I. Stand pipes and hose cabinets shall be provided per NFPA 14, state and local codes.
- J. Backflow preventers shall meet the current requirements of ASSE 1013, ASSE 1015, ASSE 1047 and/or ASSE 1048.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in shipping containers and maintain in place until installation.
- B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.07 MAINTENANCE SERVICE

- A. Provide service and maintenance of fire protection system for one year from date of Substantial Completion.
- B. Contractor shall explain all components of the fire protection system and demonstrate their operation and maintenance to the owner's representative.
 - 1. All demonstrations and training shall be video-taped by the Fire Protection Contractor. Two copies shall be turned over to the owner's representative.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sprinklers, Valves, and Equipment:
 - 1. Victaulic Corp.
 - 2. Viking Corp.
 - 3. Grinnell Corp.
 - 4. Globe Fire Sprinkler Co.
 - 5. Reliable Automatic Sprinkler Co., Inc.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 GENERAL SYSTEM AND PRODUCT REQUIREMENTS

- A. Sprinkler System: Conform to NFPA 13.
- B. Standpipe and Hose Systems: Conform to NFPA 14.
- C. Welding Materials and Procedures: Conform to ASME Code.

2.03 SPRINKLER SYSTEM

- A. Sprinkler System: Provide coverage for building areas noted.
- B. Occupancy: Light hazard; comply with NFPA 13. Provide ordinary hazard in spaces where required and/or noted.
- C. Water Supply: Determine volume and pressure from water flow test data.
 - 1. Contractor shall perform their own flow test before submission of submittal drawings. Design shall be revised to reflect contractor's flow test.
 - 2. The contractor shall perform a flow test during construction and a final flow test before startup to verify design conditions.
- D. Interface system with building fire and smoke alarm system.
- E. Provide fire department connections where indicated.
- F. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.

2.04 SPRINKLERS

- A. Provide automatic sprinklers as listed by UL and F.M. Global
 - 1. Sprinkler heads shall be fusible solder link or glass bulb type. Body shall be die cast brass, with hex-shaped wrench boss cast into body to facilitate installation and reduce the risk of damage during installation.
 - 2. Provide brass upright pendant and side wall sprinklers as required on exposed piping in unfinished spaces.

3. Provide white exposed pendant sprinkler heads in finished areas such as storage rooms and janitors closets.
 4. Provide white semi-recessed pendant heads with matching escutcheon in all finished areas except as noted.
 5. Provide concealed ceiling sprinklers with white cover plate in the corridors, restrooms, and locker/shower rooms.
 6. Provide semi-recessed pendant heads with matching escutcheon in all Auditorium and Stage area of color as selected from Manufacturer's Standard Colors.
 7. Center heads in ceiling tile in corridors. All other heads in lay-in ceiling areas shall be in tile not within 4 inches of grid.
 8. Provide bolt or screw fastened, heavy duty wire guards for sprinkler heads in gymnasiums and mechanical rooms. Heavy duty wire guards shall be equal to Victaulic Firelock Heavy Duty Sprinkler Guards.
 9. Escutcheons and guards shall be listed, supplied and approved for use with the sprinkler piping by the sprinkler manufacturer.
- B. Suspended Ceiling Type: Semi-recessed pendant type with matching push on escutcheon plate.
1. Response Type: Quick.
 2. Coverage Type: Standard.
 3. Finish: Brass.
 4. Fusible Element: Solder link or glass bulb type temperature rated for specific area hazard.
 5. Connection type: NPT or Grooved
- C. Suspended Ceiling Type: Concealed pendant type with matching push on escutcheon plate.
1. Response Type: Quick
 2. Coverage Type: Standard.
 3. Finish: Enamel, color White except Auditorium which shall be color as selected by Architect.
 4. Escutcheon Plate Finish: Enamel, color White except Auditorium which shall be color as selected by Architect.
 5. Glass bulb type temperature rated for specific area hazard.
 6. Connection type: NPT or Grooved
- D. Exposed Area Type: Pendant type with guard.
1. Response Type: Quick.
 2. Coverage Type: Standard.
 3. Finish: Brass.
 4. Fusible Element: Solder link or glass bulb type temperature rated for specific area hazard.
 5. Connection type: NPT or Grooved
- E. Sidewall Type: Semi-recessed horizontal sidewall type with matching push on escutcheon plate.
1. Response Type: Quick.
 2. Coverage Type: Standard.
 3. Finish: Brass.
 4. Fusible Element: Solder link or glass bulb type temperature rated for specific area hazard.
 5. Connection type: NPT
- F. Dry Sprinklers: Concealed pendant type with matching push on escutcheon plate.
1. Response Type: Quick.
 2. Coverage Type: Standard.
 3. Finish: Brass.
 4. Cover Plate Finish: Brass.
 5. Fusible Element: Solder link or glass bulb type temperature rated for specific area hazard.
 6. Connection type: NPT or Grooved

- G. Guards: Finish to match sprinkler finish.

2.05 PIPING SPECIALTIES

- A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
 - 1. Activate electric alarm.
 - 2. Test and drain valve.
 - 3. Replaceable internal components without removing valve from installed position.
- B. Provide vane type waterflow indicator with tamper switch and electronic retard adjustable up to 90 seconds. Units shall comply with NFPA #71 and #72. Provide equal to Systems Sensor model WFD or Potter Electric VSR-F waterflow indicator.
- C. Provide a valve position supervisory switch for monitoring W.I.V. valve. Provide equal to System Sensor OSY2 ,Potter Electric PCVS or OSYSU-A2, or Viking VSR-D supervisory switch.
- D. Provide a test station for testing alarm systems. Provide control valve test and drain assembly. Locate test stations in janitors closets, drain to floor service sinks.
- E. Provide grooved check valves and butterfly valves with tamper units in locations as required. Coordinate locations and connections with electrical contractor.
- F. Electric Alarm: Provide 120V, electrically operated, 8" chrome plated gong with pressure alarm switch. Gong shall be installed by the electrical contractor. Coordinate the exact location with the electrical contractor.

2.06 ABOVE GROUND PIPING

- A. Steel Pipe: ASTM A 795 Schedule 10, ASTM A 53 Schedule 40, or ASTM A 135/795 Schedule 40, black.
 - 1. Steel Fittings: ASME B16.9, wrought steel, buttwelded.
 - 2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
 - 3. Mechanical Grooved Fittings: Ductile iron, conforming to ASTM A 536; forged steel, conforming to ASTM A 234; or factory-fabricated from carbon steel pipe, conforming to ASTM A 53; with grooved ends conforming to ANSI/AWWA C606.
 - 4. Mechanical Grooved Couplings: Ductile iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
 - a. Rigid Type: Coupling housings cast with offsetting, angle-pattern bolt pads shall be used to provide system rigidity and support and hanging in accordance with NFPA 13. Tongue and recess rigid type couplings shall only be used if the contractor uses a torque wrench for installation. Required torque shall be in accordance with the manufacturer's latest recommendations. This shall be field verified by the engineer's field representative.
 - 1) 1-1/4" through 12" rigid coupling shall be "Installation Ready" stab-on type coupling, designed for direct "stab" onto grooved end pipe without prior field disassembly and no loose parts.
 - b. Flexible Type: Use in locations where vibration attenuation and stress relief are required.
 - c. Flange Adapter: Flat face, for direct connection to ANSI Class 125/150 flanged components.
 - 5. Installation-Ready fittings for schedule 40 and schedule 10 grooved end steel piping in fire protection application sizes NPS 1 1/4" thru 2 1/2". Fittings shall be equal to Victaulic Firelock.

6. Installation ready fittings for schedule 40 and schedule 10 fittings and couplings may be used for 1" NPS carbon steel piping. Fittings shall be equal to Victaulic Firelock IGS.
- B. Flexible Hose Sprinkler Head Connection: Flexible sprinkler connection assemblies shall be fully welded, non-mechanical fitting type, with minimum 1 inch internal diameter corrugated type 304 stainless steel hose, type 304 stainless steel braided outer cover and collar, 1 inch NPT male inlet and stainless steel or carbon steel 1 inch x 1/2 inch or 1 inch x 3/4 inch NPT female reducer outlet. Seals, when utilized shall be EPDM. Open gate ceiling bracket shall be direct attachment type having integrated snap-on clip ends positively attached to the ceiling using tamper-resistant screws and a removable attachment hub with a set screw. Ceiling attachment shall incorporate a tamper resistant label for visual verification of inappropriate removal or relocation. The flexible sprinkler connection assembly shall be UL listed and FM global approved for fire protection service, and seismically qualified pursuant to ICCESAC-156. Assembly shall be equal to Victaulic AH2 or AH2-CC series. Sprinkler heads shall be equal to Victaulic VicFlex with Victaulic Firelock IGS grooved style 108 fitting.
- C. In lieu of dry type rigid sprinkler heads, a flexible hose sprinkler head connection equal to Victaulic VicFlex dryer sprinkler model VS1. The sprinkler shall provide a vertical or horizontal flexible connection with a bend radius to 2" and allow for up to four bends. Provide bracket equal to Victaulic AB6 bracket.

2.07 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports per NFPA 14 requirements.
- B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
- C. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis, or malleable iron, adjustable swivel, split ring.
- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- E. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
- F. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
- G. Structural Supports shall be beam clamps, sloped beam clamps, or strap in strut mount hangers.
 1. Arrange all mechanical supports to prevent eccentric loading of joists and joist girders. Locate supports at joist panel points.
 2. 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.
 3. Unless specifically indicated or approved by Garmann Miller & Associates Inc. do not provide support from roof decks or floor decks.
- H. Vertical Support: Steel riser clamp.

2.08 GLOBE OR ANGLE VALVES

- A. Up to and including 2 inches:
 1. Bronze body, bronze trim, rising stem and handwheel, inside screw, renewable rubber disc, threaded ends, with backseating capacity repackable under pressure.
- B. Over 2 inches:
 1. Iron body, bronze trim, rising stem, handwheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

2.09 BALL VALVES

- A. Up to and including 2 inches:
 1. Bronze two piece body, chrome plated brass, or stainless steel ball, teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union.

2. Brass two piece body, chrome plated brass, or stainless steel ball, Teflon seats, weatherproof actuator housing, worm gear operated, threaded or grooved ends.
- B. Over 2 inches:
1. Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle or gear drive hand wheel for sizes 10 inches and over, flanged.
 2. Ductile iron body, chrome plated carbon steel ball and stem, Teflon seats, lever handle and grooved ends.

2.10 BUTTERFLY VALVES

- A. Bronze Body:
1. Stainless steel disc, resilient replaceable seat, threaded or grooved ends, extended neck, handwheel and gear drive and integral indicating device, and built-in tamper proof switch rated 10 amp at 115 volt AC.
- B. Cast or Ductile Iron Body
1. Electroless-nickel coated ductile iron disc, stem offset from the disc centerline to provide a complete 360 degree circumferential seating, grooved ends, weatherproof actuator housing with handwheel and gear drive, and integral indicating device, and built-in tamper proof switch rated 10 amp at 125 volt AC. Valve shall be equal to Victaulic Series 705.

2.11 CHECK VALVES

- A. Up to and including 2 inches:
1. Bronze body and swing disc, rubber seat, threaded ends.
- B. Over 2 inches:
1. Iron body, bronze trim, swing check with rubber disc, renewable disc and seat, flanged ends with automatic ball check.
 2. Ductile iron body, stainless steel trim, spring-assisted check for vertical or horizontal installation, with aluminum bronze or elastomer encapsulated ductile iron disc; grooved ends. Valve shall be equal to Victaulic Series 717.
- C. 4 inches and Over:
1. Iron body, bronze disc, stainless steel spring, resilient seal, threaded, wafer, or flanged ends.

2.12 DRAIN VALVES

- A. Compression Stop:
1. Bronze with hose thread nipple and cap.
- B. Ball Valve:
1. Brass with cap and chain, 3/4 inch hose thread.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel or groove plain end ferrous pipe.
- B. Prepare piping connections to equipment with grooved joint couplings, flanges or unions.
- C. Clean pipe to prevent MIC (Microbially Influenced Corrosion).
- D. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

- A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
- B. Prepare piping connections to equipment with grooved joint couplings, flanges or unions.
- C. Install standpipe piping, hangers, and supports in accordance with NFPA 14.
- D. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

- E. Install piping to conserve building space, to not interfere with use of space and other work.
- F. Group piping whenever practical at common elevations.
- G. Sleeve pipes passing through partitions, walls, and floors.
- H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- I. Pipe Hangers and Supports:
 - 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 2. Place hangers within 12 inches of each horizontal elbow.
 - 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 - 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 6. All hangers shall be located at steel joists panel points.
- J. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- K. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding. Refer to Section 09 9000.
- L. Do not penetrate building structural members unless indicated.
- M. Provide sleeves when penetrating footings, floors, and walls. Seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.
- N. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided. Unions or flanges for servicing and disconnect are not required in installations using grooved joint couplings.
- O. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.
- P. Provide drain valves at main shut-off valves, low points of piping and apparatus.
- Q. Install equipment in accordance with manufacturer's instructions.
- R. Provide approved double check valve assembly at sprinkler system water source connection.
- S. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle.
- T. Locate outside alarm gong on building wall as required by NFPA and local authority having jurisdiction. Coordinate exact location with electrical contractor.
- U. Place pipe runs to minimize obstruction to other work.
- V. Place piping in concealed spaces above finished ceilings.
- W. Center sprinklers in two directions in ceiling tile and provide piping offsets as required. All other sprinkler heads in lay-in ceiling areas shall be in tile to within 4 inches of grid.
- X. Do not install sprinklers that have been dropped, damaged, show a visible loss of fluid, or a cracked bulb.
- Y. The sprinkler bulb protector shall be removable by hand, without tools or devices that may damage the bulb.

- Z. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
- AA. Install and connect to fire pump system in accordance with Section 21 30 00.
- BB. Flush entire piping system of foreign matter.
- CC. Install guards on sprinklers in gymnasiums and where indicated on drawings..
- DD. Hydrostatically test entire system.
- EE. Require test be witnessed by Fire Marshal.
- FF. Grooved Joints: All grooved couplings, fittings, valves and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be molded and produced by the grooved coupling manufacturer. Grooved ends shall be clean and free from indentations, projections and roll marks in the area from the pipe end to groove. Grooved coupling manufacturer's factory trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application of groove, and installation of grooved piping products. Factory trained representative shall periodically inspect the product installation. Contractor shall remove and replace any improperly installed products.
- GG. Locking Lug (FIT®) Joints: Pipe ends shall be square cut and thoroughly clean on the OD, for 1" from the pipe end to remove pipe coatings, mill scale, rust and raised weld beads. OD burrs and sharp edges shall be removed. Pipe shall be marked 1-1/2" from the end and pipe end configuration shall be in conformance with manufacturer specifications.
- HH. Vic-Press® Joints: Pipe shall be square cut, +/- 0.030", properly deburred and cleaned. Pipe ends shall be marked at the required location, using a manufacturer-supplied gauge, to ensure full insertion into the coupling or fitting during assembly. Use a manufacturer approved tool with the proper sized jaw for pressing.

3.03 TESTING AND REPAIR

- A. Upon completion of each respective piping/ductwork system, but prior to insulating, covering, or backfilling, each system shall be thoroughly cleaned and flushed to remove construction dirt and foreign matter.
- B. Test Piping per the NFPA and as Specified Herein
 - 1. No piping work shall be concealed or covered until it has been inspected and approved by the project inspector, who shall be notified when the Work is ready for inspection. Work shall be completely installed and tested as required by this Contract and Ordinances of the local Municipality and shall be leaktight to the satisfaction of those making the inspection and the Architect/ Engineer.
 - 2. In general, pressure tests shall be applied to piping. In no case shall piping be subject to pressure exceeding its rating. Defective work shall be promptly repaired or replaced and test shall be repeated until the particular system and component parts thereof receive approval of the Architect/Engineer.
 - 3. Provide temporary equipment for testing, including pump, blower, and gauges. Test piping system before insulation is installed and remove control devices before testing. Test each natural section of each piping system independently, but do not use piping system valves or to isolate sections where test pressure exceeds valve pressure rating.
 - 4. Repair piping system sections which fail required piping test by disassembly and reinstallation, using new materials to extent required to overcome leakage. Do not use chemicals, stopleak compounds, mastics, or other temporary repair methods.
 - 5. Drain test water from piping systems after testing and repair work has been completed.
 - 6. Pressure for Testing of Piping Systems shall be as follows:
 - a. Fire Protection Piping System (Interior)

- 1) Per NFPA #13, state and local codes.
 7. Accurately record and report methods of testing, times, and dates of test, witnesses to the test, and the results of the test. Test reports shall be neatly typewritten on standard 8-1/2 inch by 11 inch sheets and submitted in 5 copies to Architect/Engineer for approval within 5 days after test has been performed.
- C. Damage resulting from tests shall be repaired or damaged materials replaced, to satisfaction of Architect/Engineer, and at no cost to Owner.

END OF SECTION

**SECTION 21 22 00
CLEAN-AGENT FIRE-EXTINGUISHING SYSTEM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Total flooding extinguishing system for enclosed spaces.
- B. Fire detection system.
- C. Control and supervision systems.
- D. Extinguishing agent, containers, distribution and discharge system.
- E. System maintenance after closeout.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 21 05 53 - Fire Suppression Identification.
- C. Section 21 13 00 - Fire Protection Systems.
- D. Section 26 05 83 - EQUIPMENT WIRING: Electrical characteristics and wiring connections.
- E. Section 28 46 00 - Fire Detection and Alarm: Building fire alarm system and devices.

1.03 REFERENCE STANDARDS

- A. ASME B31.1 - Power Piping 2022.
- B. ASME (BPVC-VIII, 1) - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; The American Society of Mechanical Engineers; 2015.
- C. FM (AG) - FM Approval Guide; Factory Mutual Research Corporation; current edition.
- D. ITS (DIR) - Directory of Listed Products Current Edition.
- E. NEMA ICS 6 - Industrial Control and Systems: Enclosures 1993 (Reaffirmed 2016).
- F. NFPA 72 - National Fire Alarm and Signaling Code Most Recent Edition Cited by Referring Code or Reference Standard.
- G. NFPA 2001 - Standard on Clean Agent Fire Extinguishing Systems 2022.
- H. UL (DIR) - Online Certifications Directory Current Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: To bear stamp of approval of Authority Having Jurisdiction. Provide for each piece of equipment comprising the system including detectors, release devices, discharge nozzles, manual controls, alarm devices, annunciators, extinguishing agent containers, manifolds, and control panel.
- C. Shop Drawings: To bear stamp of approval of Authority Having Jurisdiction. Indicate detailed layout of system, including piping and location of each component. Include control diagrams, wiring diagrams, and written sequence of operation.
 - 1. Drawing Scale: 1/8 inch to 1 foot, minimum; use larger scale for details.
- D. Installer's Qualification Statement.
- E. Certificates: Certify that products meet or exceed specified requirements.
 - 1. Manufacturer: Certify that system meets or exceeds specified requirements.
- F. Test Reports: Indicate successful completion of tests; include certification of extinguishing agent container pressure and extinguishing agent quantity.
- G. Installer's Qualification Statement.

- H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide two year system warranty for complete replacement fire extinguishing agent.

PART 2 PRODUCTS

2.01 FIRE SUPPRESSION SYSTEM MANUFACTURERS

- A. System Components Other Than Pipe, Piping Specialties, Conduit, Wiring, and Wiring Devices:
 - 1. ANSUL, a Tyco Business; using INERGEN extinguishing agent: www.ansul.com/#sle.
 - 2. Kidde Fire Systems, a UTC Company; [____]: www.kidde-fenwal.com/#sle.
 - 3. Fenwal Protection Systems, a UTC Company; Novec1230: www.fenwalfire.com.
 - 4. Pyro-Chem, a Tyco Fire Business; using FM 200 as extinguishing agent: www.pyrochem.com/#sle.
 - 5. Victaulic - Vortex 500.
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 APPLICATIONS

- A. Computer Room: Location of devices:
 - 1. Smoke Detector: One at ceiling, and two below floor.

2.03 FIRE SUPPRESSION SYSTEM

- A. Fire Suppression System: Complete fire detection and suppression system that totally floods protected area with fire extinguishing agent to extinguish fire.
 - 1. Comply with NFPA 2001 and NFPA 72.
 - 2. Fire Extinguishing Agent: Any allowed by NFPA 2001.
 - 3. Locate extinguishing agent supply in each protected area.
 - 4. Locate manual release stations at each exit from protected area.
 - 5. Locate abort stations at each exit from protected area.
 - 6. Provide all manufactured system components from a single source and by a single manufacturer.
 - 7. Provide components listed and labeled by ITS (DIR) or UL (DIR) for the type of system required and for use with the other components of the system.
- B. Design Criteria: Provide total flooding of fire extinguishing agent at manufacturer's recommended concentration by volume, in maximum discharge time of 10 seconds, for period of 10 minutes and with 10 percent allowance for room leakage.
 - 1. Direct discharge parallel to ceiling; use 360 degree pattern nozzles except where obstructions would make 360 distribution inefficient.
 - 2. Provide sufficient amount of fire extinguishing agent. Consider the following when computing volume:
 - a. Volume of protected area.
 - b. Specific volume of fire extinguishing agent.
 - c. Additional quantities of fire extinguishing agent required to compensate for openings, pipe losses.
 - d. Other special conditions affecting extinguishing agent concentration.

2.04 EXTINGUISHING AGENT CONTAINERS

- A. Containers:
 - 1. Where multiple, replaceable containers are used, provide only containers of the same size and holding the same amount of extinguishing agent.
- B. Contents: Fill with required fire extinguishing agent.

- C. Identification: Permanent plate or marking, specifying agent, tare and gross weight, pounds of fire extinguishing agent, and pressurization level; installed so plate or marking is visible and readable.
- D. Valves: Heavy duty forged brass, with safety pressure relief device, manual control, discharge valve, and pressure gauge.
- E. Pressure Gauge: Visual indicator of internal pressure.
- F. Manifold: Provide for systems with more than one container, with rack to secure each and check valves between each discharge and manifold.
- G. Wall Bracket: Manufacturer's standard; UL (DIR) listed, welded steel construction, modular design with saddle bottom and front bracket.

2.05 MANUAL STATIONS

- A. Manual Release Station: Semi-flush housing fitted with double action control fitted with "push in" tab and "pull down" lever that locks in position after releasing spring-loaded contact switch, for mounting on electrical outlet box; addressable using manufacturer's standard monitor module.
 - 1. Activate all audible and visual alarms.
 - 2. Override any abort station or time delay function.
 - 3. Activate all release and shutdown functions normally triggered by detectors or alarm system.
 - 4. Locate engraved label adjacent to each manual release station indicating area protected and that actuation will cause discharge of fire extinguishing agent.
- B. Manual System Abort Switch: Stainless steel plate with momentary contact push button, countdown timer, magnetic door holders manual release, for mounting on electrical outlet box; addressable using manufacturer's standard monitor module.
 - 1. Locate engraved label adjacent to each manual abort station, indicating area protected and that actuation will prevent discharge of fire extinguishing agent after automatic system is activated.

2.06 DETECTORS

- A. Ionization Smoke Detectors: UL (DIR) listed, NFPA 72, adjustable sensitivity, operating on ionization principle, activated by combustion products, plug-in, twist-lock unit easily removed from base.
- B. Heat Detectors: UL (DIR) listed, NFPA 72, micro-processor based, thermistor type, that responds to a fixed temperature with minimal thermal lag.

2.07 DISCHARGE NOZZLES

- A. Nozzles: UL (DIR) listed; orifice size providing required rates of discharge and coverage and to distribute extinguishing agent uniformly throughout protected area.
- B. Construction: Two-piece chrome plated brass or aluminum nozzle with textured finish with female pipe thread integral on body; one-piece deflector plate.
- C. Identification: Permanently mark nozzles with manufacturer's part number, UL listing and equivalent single orifice diameter.

2.08 CONTROLS AND CONTROL PANEL

- A. Controls: Combination type approved as both alarm and releasing device, with solid state internal circuitry enclosed in NEMA ICS 6, Type 1 cabinet.
- B. Provide supervision to NFPA 72, Class A of following circuits for wire break or ground faults:
 - 1. Zone detection loops.
 - 2. Suppression system solenoid valves.
 - 3. Power supply and circuit wiring and fuse.

4. Battery interconnecting wires and fuse.
 5. Alarm in abort mode.
- C. Conceal control switches and indicators, with exception of Power On, Master Trouble, Supervisory Trouble, Circuit 1 Alarm, Circuit 2 Alarm and Release Indicators.
- D. Equip panel with following standard features:
1. Visual and audible annunciation of trouble or alarm signals.
 2. Panel reset switch.
 3. Trouble alarm silence switch with ring back feature.
 4. Battery test meter and switch.
 5. Manual discharge switch.
 6. Deadman abort switch.
 7. Programmable timers for pre-discharge and discharge, 0 to 60 second cycle.
 8. Isolated relay contactors for external alarm or equipment and ventilation shutdown.
 9. Relay contactors for general trouble signal.
 10. Relay contactor activated by detector zone board in alarm or trouble mode.
- E. Annunciation: Provide the following annunciation:
1. Power On: Green.
 2. System Trouble: Amber.
 3. Battery Trouble: Amber.
 4. Ground Fault: Amber.
 5. Release trouble: Amber.
 6. Agent Release: Red.
 7. Alarm Output Trouble: Amber.
 8. Supervisory Trouble: Amber.
- F. Batteries: Provide nickel cadmium batteries and charger for continuous operation of detection, alarm, actuation and supervision functions for 24 hours. Provide automatic battery switch-over upon failure of primary power supply.

2.09 MISCELLANEOUS EQUIPMENT

- A. Mounting Height: Mount miscellaneous equipment listed above 80 inches above floor or 72 inches, whichever is lower.
- B. Alarm Bells: 24 volts, with supervision of circuit wiring, of modular design, red baked enamel finish, with minimum sound level of 84 dba at 10 feet, for mounting on 4 inch electrical outlet box.
- C. Alarm Horns: 24 volts, with supervision of circuit wiring, with minimum sound level of 90 dba at 10 feet, for mounting on 4 inch electrical outlet box.
- D. Strobe Beacon: Manufacturer's standard design, 24 volts, with system identification on strobe lens.

2.10 OPERATING SEQUENCE

- A. Actuation of one detector in either zone circuit:
 1. Illuminate zone indicator.
 2. Energize alarm bell.
 3. Shut down air-conditioning system and close dampers.
 4. Close doors to area.
 5. Signal building fire alarm system.
- B. Actuation of second detector on second zone circuit:
 1. Illuminate zone indicator.
 2. Energize alarm horn.
 3. Shut down power to protected equipment.

4. Actuate time delay for up to 30 seconds.
 5. Release extinguishing agent into protected area.
 6. If abort switch is engaged, delay release.
 7. Upon abort switch disengagement release extinguishing agent unless system cleared and reset.
- C. Discharge of Extinguishing Agent:
1. Sounds alarm bells and horns.
 2. Operates strobes.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with referenced standards in PART 2 of this section and NFPA 2001.
- B. Route piping in orderly manner, concealed, plumb and parallel to building structure, and maintain gradient. Install piping to conserve building space, and not interfere with use of space and other work.
- C. Securely support piping in accordance with ASME B31.1 with allowance for fire extinguishing agent thrust forces, and thermal expansion and contraction.
- D. Install unions downstream of valves and at equipment or apparatus connections.
- E. Identify in accordance with requirements of referenced standard.
- F. Install wiring in accordance with Section 26 05 83 requirements.
- G. Make final connections between equipment and system wiring under direct supervision of factory trained representative of manufacturer.
- H. Install engraved plastic instruction plate, detailing emergency procedures, at control panel and at each manual discharge and abort switch location. At control panel identify control logic units, contacts, and major circuits with permanent nameplates.
- I. Locate discharge nozzle approximately 6 inches above or below ceiling and 6 inches below raised floors. Avoid interference with other piping and equipment.
- J. Locate remote manual releases at one or more doors to protect area where indicated. Locate deadman abort switch adjacent.

3.02 INTERFACE WITH OTHER PRODUCTS

- A. Provide signal to building fire alarm system. Refer to Section 28 46 00.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 43 00 - Quality Assurance.
- B. Test distribution piping and valving, prior to nozzle installation, to 50 psi air pressure test. Inspect joints using soap water solution or halide torch or lamp. Repair leaks and retest. Maintain test pressure for four hours.
- C. Upon completion of installation provide final checkout inspection by factory trained representative of manufacturer to ascertain proper system operation. Leave system in a fully commissioned and automatic readiness state with circuitry energized and supervised.
- D. Test circuits including automatic discharge, manual discharge, equipment shut-down, alarm devices, and storage container pressure. Test supervision of each circuit.
- E. Check each ionization detector with a sensitivity meter, adjust. Record sensitivity, and include record in test report.
- F. Submit original copies of tests, indicating that factory trained technical representatives of the manufacturer have inspected and tested systems and are satisfied with methods of installation, connections and operation.

- G. Pressure test entire enclosure with test fan, pressurizing protected area both under positive and negative conditions. Confirm that leakage is within system design allowance.

3.04 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate that components, except discharge assemblies, are functioning properly and in conjunction with controls system.

3.05 MAINTENANCE

- A. Provide inspections and maintenance performed by competent personnel in the employ of the system installer.
- B. Conduct inspections at 6 months and 12 months from Date of Substantial Completion to verify proper operation of system, check agent container weight and pressure, and a thorough check of controls, detection and alarm systems.
- C. Remedy of all deficiencies shall be included at no extra cost to Owner except for replacement of agent due to discharge under normal use or damage due to abuse.
- D. Submit documents certifying satisfactory system conditions. Include manufacturer's certificate of acceptance of inspector's qualifications.

END OF SECTION

Division 22

Plumbing

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**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. Maintenance and operating manuals
- M. 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 07 8400 - Firestopping. Electrical Contractor shall provide submittals for fire stopping based on Section 07 8400.
- C. Refer to Division 26, Electrical Specifications, and to the requirements stated therein applicable to the Mechanical Work, where coordination of trades is covered.
- D. 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.
- E. 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. The Contractor(s) shall make arrangements for connection of the permanent utilities (gas); include connection costs as part of the Work under this Contract. Verify exact requirements of the utility with regard to such service; and include in the Work costs related to same.
- D. 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.
- E. 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.
- F. Related Work Specified Elsewhere
 - 1. Firestopping is Work of this Section though fire barrier sealants (firestopping) for walls and floors are specified in Section 07 8400. Contractors are responsible for proper sizing of their sleeves and core-drilled holes so that they are at least 1-1/2 inches larger in diameter than the penetrating items. Schedule 40 steel sleeves and core-drilled holes made excessively large or made and not used, will be firestopped and charged to the Contractor who was responsible.
- G. Related Work by Others
 - 1. Motors which are shipped loose from the mechanical equipment shall be installed as Work under Division 26, Electrical, or other trades as may be required, at the expense of the Contractor furnishing the loose motor(s).
 - 2. Unless otherwise stipulated under a specific Section of this Division, motor disconnects and starters shall be provided as Work under Division 26, Electrical.
 - 3. 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.
- H. 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. AGA American Gas Association
 - 2. ANSI American National Standards Institute
 - 3. ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers
 - 4. ASME American Society of Mechanical Engineers
 - 5. ASPE American Society of Plumbing Engineers
 - 6. AWS American Welding Society
 - 7. AWWA American Water Works Association
 - 8. CISPI Cast Iron Soil Pipe Institute
 - 9. NFPA National Fire Protection Association
 - 10. OSHA Occupational Safety and Health Act

11. SMACNA Sheet Metal and Air Conditioning Contractors National Association
 12. 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 54 - National Fuel Gas Code
 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 Owner'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 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.
- H. Pressure piping systems installed shall conform to the requirements of the State piping and welding codes where applicable.

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 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.

1.08 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.

1.09 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. 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. Alignment of motors, that are factory coupled or mounted and field coupled and mounted, shall be performed by the equipment manufacturer and shall be rechecked after connections have been made and after 48 hours of operation in designed service.
 - 2. 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. 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.
- D. 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 insulated piping passes through fire barriers, stop insulation at barrier for fire barrier penetration seal.
9. Where piping passes through non-fire rated, or non-waterproof, partitions, floors, and walls, apply pipe insulation continuous through pipe sleeves.
10. Do not install sleeves through suspended ceilings.
11. Caulk non-fire rated sleeves with sealant.

E. 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.

F. 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 CONCRETE HOUSEKEEPING PADS

- A. Contractor shall refer to Specification Section 03 3000 for requirements of concrete housekeeping pads.

3.03 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.

3.04 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.

3.05 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.
 - 1. All demonstrations and training shall be video-taped by the Division 22 Plumbing Contractor. Two copies shall be turned over to the owner's representative.

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 03
WORK IN EXISTING BUILDING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cutting and patching of existing material
- B. Protection of existing conditions
- C. Demolition work
- D. Existing facility operation

1.02 RELATED REQUIREMENTS

- A. Section 01 3329 - Sustainable Design Reporting
- B. Section 02 4100 - Demolition.
- C. Section 22 0501- Plumbing Materials and Methods.

1.03 QUALITY ASSURANCE

- A. This Contractor shall be responsible for cutting and patching of existing walls, roofs, floors, and ceilings required for the installation of new plumbing work. Openings shall be neatly drilled or cut.
- B. Patching shall be performed by a workman skilled in the trade involved, and patch work shall match the existing surface and finished in a manner completely acceptable to the Architect.
- C. New Work in finished spaces of existing buildings shall be installed concealed unless directed by Architect/Engineer to run exposed.
- D. Contractor shall visit the Project and verify existing conditions prior to bidding.
- E. Protect existing work, equipment, fixtures, and systems from damage.
- F. Contractor shall take necessary steps to protect the building and all interior finishes from damage during the installation of his work.
- G. The Contractor(s) shall perform demolition work as shown on the Drawings and as specified herein or as may otherwise be required.
 - 1. Plumbing items to be removed shall be as indicated on Drawings.
 - 2. The Owner may select items of equipment and material he wishes to retain and these items shall be moved to the location he designates. Other items shall be removed from the premises. Contractor shall verify with owner before any equipment is removed from the premises.
- H. The continuity of operation of existing facilities during construction of the new Work shall be required. The actual length of time for an interruption shall be held to an absolute minimum. At least 48 hours in advance of an installation of new services, submit a specific plan to the Engineer and the Owner detailing the nature and estimated duration of the interruption and the method of procedure. Do not proceed with an interruption of service without the Owner's authorization.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Not Applicable.

PART 3 EXECUTION

3.01 CLEANING

- A. The contractors shall clean all areas of debris and items to be disposed of in all areas where work is performed under each contract.

END OF SECTION

**SECTION 22 05 53
PLUMBING IDENTIFICATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. 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 MANUFACTURERS

- A. Seton Identification Products
- B. Brady Corporation
- C. Champion America, Inc
- D. Brimar, Inc.
- E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 NAMEPLATES

- A. Description: Laminated three-layer plastic or aluminum with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Black.

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
 - 3. HWR - Domestic Hot Water Return
 - 4. NP - Non Potable Water
 - 5. NG - Natural Gas

- 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.
- J. Provide ceiling tags to locate valves above T-bar type panel ceilings. Locate on ceiling grid below location of system equipment.

END OF SECTION

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**SECTION 22 07 19
PLUMBING PIPING INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

- A. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation 2017.
- B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2020a.
- C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation 2022a.
- D. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation 2022.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- F. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- 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 that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product property performance, and thickness.

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, UL 723, or NFPA 255.

2.02 GLASS FIBER

- A. Manufacturers:
 - 1. Johns Manville Corporation; []: www.jm.com/#sle.

2. Knauf Fiber Glass
 3. Owens Corning Corp
 4. Manson
 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Insulation: ASTM C547 ; rigid molded, noncombustible, end grain adhered to jacket.
1. K Value: ASTM C177, 0.24 at 75 degrees F.
 2. Maximum Service Temperature: 850 degrees F.
 3. Maximum moisture absorption: 5 percent by weight.
- C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- E. All joints to be sealed with factory-applied, self-seal lap and butt strips.

2.03 FLEXIBLE ELASTOMERIC FOAM INSULATION

- A. Manufacturers:
1. Aeroflex USA, Inc; Aerocell
 2. Armacell LLC
 3. K-Flex USA LLC
 4. Nomaco.
 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Insulation material shall be an EPDM rubber, flexible, closed-cell elastomeric insulation in tubular or sheet form. The product will be tested for and meet or exceed the requirements defined in ASTM C 534.
- C. EPDM elastomeric insulation material shall be manufactured without the use of CFC's, HFC's or HCFC's.
- D. EPDM elastomeric insulation shall have a flame-spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E 84, for all products through 2" thickness. Product to be suitable for use from -297F to 300F continuous service temperature, per ASTM C 411.
- E. EPDM elastomeric insulation shall have a maximum thermal conductivity of 0.245 Btu-in./h-ft² F at a 75 F mean temperature when tested in accordance with ASTM C 177 or ASTM C 518.
- F. EPDM elastomeric insulation shall have a maximum water vapor transmission of 0.03 perm-inches when tested in accordance with ASTM E 96, Procedure A, latest revision.
- G. Product must exhibit long-term UV resistance, when unfinished in outdoor installations, per ASTM G 7 and ASTM G 90.
- H. EPDM elastomeric insulation must not contribute to external stress corrosion cracking as when tested by ASTM C 692.
- I. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
Accessories and adhesives shall not detract from any of the system ratings as specified above.

2.04 JACKETS

- A. PVC Plastic.
1. Manufacturers:
 - a. Knauf
 - b. Owens Corning Corp
 - c. Johns Manville International, Inc
 - d. Certainteed Corp
 - e. Zeston 2000
 - f. PROTO PVC Corp.

- g. VentureClad
- h. Speedline Corp.
- i. Substitutions: See Section 01 60 00 - Product Requirements.
- 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
 - 1. Thickness: 0.016 inch sheet.
 - 2. Finish: Smooth.
 - 3. Joining: Longitudinal slip joints and 2 inch laps.
 - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with the Midwest Insulation Contractors Association (MICA), National Commercial and Insulation Standard.
- C. All insulation shall be applied so that there is no fiberglass exposed to the return air plenum. 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. Exposed Piping: Locate insulation and cover seams in least visible locations.
- E. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- F. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive, Hi/Low Temp Inserts, and PVC fitting covers.
- G. Glass fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- H. Inserts and Shields:
 - 1. Application: Piping 1/2 inches diameter or larger.
 - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 - 3. Insert Location: Between support shield and piping and under the finish jacket.

4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- I. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.
 - J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 5 feet above finished floor): Finish with PVC jacket and fitting covers.
 - K. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with PVC or aluminum jacket with seams located on bottom side of horizontal piping.

3.03 SCHEDULES

- A. Plumbing Systems:
 1. Domestic Hot Water Supply:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: 1 1/4 inch and less:
 - (a) Thickness: 1 inch.
 - 2) Pipe Size Range: 1 1/2 inch and above:
 - (a) 1 1/2 inch.
 - b. Flexible Elastomeric Foam Insulation:
 - 1) Pipe Size Range: 1 1/4 inch and below:
 - (a) Thickness: 1/2 inch.
 - 2) Pipe Size Range 1 1/2 inch and above:
 - (a) Thickness: 1 inch.
 2. Domestic Hot Water Recirculation:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: 1 1/4 inch or below:
 - (a) Thickness: 1 inch.
 - 2) Pipe Size Range: 1 1/2 inch or above:
 - (a) Thickness: 1 1/2 inch
 - b. Flexible Elastomeric Foam Insulation:
 - 1) Pipe Size Range: 1 1/4 inch and below:
 - (a) Thickness: 1/2 inch.
 - 2) Pipe Size Range: 1 1/2 inch and above:
 - (a) Thickness: 1 inch
 3. Domestic Cold Water:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: All sizes.
 - (a) Thickness: 1 inch.
 - b. Flexible Elastomeric Foam Insulation:
 - 1) Pipe Size Range: 1 1/4 inch and below:
 - (a) Thickness: 1/2 inch.
 - 2) Pipe Size Range: 1 1/2 inch and above:
 - (a) Thickness: 1 inch
 4. Non-Potable Water:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: All sizes.
 - (a) Thickness: 1 inch.
 - b. Flexible Elastomeric Foam Insulation:
 - 1) Pipe Size Range: 1 1/4 inch and below:

- (a) Thickness: 1/2 inch.
 - 2) Pipe Size Range: 1 1/2 inch and above
 - (a) Thickness: 1 inch
- 5. Sanitary Above Grade serving mechanical mezzanine floor drains.
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: All sizes.
 - (a) Thickness: 1/2 inch.
 - b. Flexible Elastomeric Foam Insulation:
 - 1) Pipe Size Range: All sizes.
 - (a) Thickness: 1/2 inch.
- 6. Roof Drain Bodies:
 - a. Flexible Elastomeric Foam Insulation:
 - 1) Pipe Size Range: All sizes.
 - (a) Thickness: 1 inch.
- 7. Roof Drainage Above Grade:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: All sizes.
 - (a) Thickness: 1 inch.
 - b. Flexible Elastomeric Foam Insulation:
 - 1) Pipe Size Range: All sizes.
 - (a) Thickness: 1 inch.

END OF SECTION

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**SECTION 22 10 05
PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Rainwater/Non-Potable
 - 4. Storm water.
 - 5. Natural Gas.
 - 6. Flanges, unions, and couplings.
 - 7. Pipe hangers and supports.
 - 8. Valves.
 - 9. Check.
 - 10. Relief valves.
 - 11. Strainers.
- B. Testing and Repair
- C. Disinfection of Domestic Water Piping System
- D. Service Connections

1.02 RELATED REQUIREMENTS

- A. Section 31 2316 - Excavation.
- B. Section 31 2323 - Fill.
- C. Section 31 2316.13 - Trenching.
- D. Section 33 1300 - Disinfecting of Water Utility Distribution.
- E. Section 07 84 00 - Firestopping.
- F. Section 08 31 00 - Access Doors and Panels.
- G. Section 09 91 23 - Interior Painting.
- H. Section 22 05 53 - Plumbing Identification.
- I. Section 22 07 19 - Plumbing Piping Insulation.
- J. Section 31 23 16 - Excavation.
- K. Section 33 01 10.58 - DISINFECTION OF WATER DISTRIBUTION.

1.03 REFERENCE STANDARDS

- A. ASME B31.2 - Fuel Gas Piping; The American Society of Mechanical Engineers; 1968.
- B. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers 2021.
- C. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2021.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- E. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings 2021.
- F. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.

- G. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube 2016.
- H. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings 2016.
- I. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings 2020a.
- J. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2021a.
- K. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping 2020.
- L. AWWA C651 - Disinfecting Water Mains 2014, with Addendum (2020).
- M. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications 2021.
- N. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).
- O. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- P. NSF 372 - Drinking Water System Components - Lead Content 2022.
- Q. MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.
- R. ANSI/ASME Section 9, AWS D10.9 and D1.1 National Certified Pipe Welding Bureau.
- S. ANSI B16.18 - Soldering Procedures.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of valves and pipe routings above ceiling and below floor.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of drawings on project site to mark pipe routings and valve locations.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.
- D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
- E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.
- F. All piping shall be American made and shall comply with the Buy American Provision of the ARRA.

1.06 REGULATORY REQUIREMENTS

- A. Perform Work in accordance with State of Ohio plumbing code.
- B. Conform to applicable code for installation of backflow prevention devices.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.08 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 SANITARY SEWER AND VENT PIPING

- A. Cast Iron Pipe: CISPI 310, hubless. Piping shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.
 - 1. Fittings: Cast iron Hubless, CISPI 310
 - 2. Joints: CISPI 310, ASTM D 1247 Standard Duty, neoprene gasket and stainless steel clamp and shield assemblies.
- B. ABS Pipe: Schedule 40 ABS DWV, ASTM D 2661 or ASTM F 628.
 - 1. Fittings: ABS.
 - 2. Joints: Solvent welded with ASTM D2235 cement.
- C. CPVC Pipe: Schedule 40, chemical waste drain, temperature rated to 220 degrees F. ASTM D1784, ASTM D2321, ASTM D2846/D2846M, ASTM F441/F441M, and/or ASTM F442/F442M.
 - 1. Fittings: CPVC; Schedule 40, chemical waste drain, temperature rated to 220 degrees F. ASTM D1784, ASTM D2321, ASTM D2846/D2846M, ASTM F437, ASTM F438, or ASTM F439.
 - 2. Joints: ASTM D2846/D2846M, solvent weld with ASTM F493 solvent cement.
- D. PVC Pipe: Schedule 40 solid wall, ASTM D1785, ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.
 - 3. Joints: No Hub, CISPI-310 compression type with ASTM C 564 neoprene gaskets and stainless steel clamp and shield assembly.
- E. Sanitary and vent piping in return air plenums, chases exposed to plenums and through fire walls shall be cast iron no hub and no hub fittings. ABS, CPVC and PVC piping will not be allowed in any of the spaces noted.
- F. Kitchen sanitary piping marked "GI" and vent piping from equipment using water 140 degrees F or above shall be constructed of one one of the following. PVC piping will not be allowed.
 - 1. Cast Iron no hub and no hub fittings.
 - 2. Schedule 40 CPVC-Chemical waste.
- G. PVC, CPVC and ABS piping shall only be used in under ground applications.

2.02 DOMESTIC WATER PIPING

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze. All fittings shall be lead free and conform to NSF-61-G.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
 - 3. Joints: Grooved Pipe. Fittings to conform to ASTM B75 or ASTM B-152.

4. Joints: Copper press fittings. Fittings to conform to ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze. All fittings shall be lead free and conform to NSF-61-G.
 5. Solders and flux: ASTM B828, ASTM B813, containing 0.2% lead or less.
- B. Grooved Pipe:
1. Manufacturers:
 - a. Victaulic, Style 607 "Quick Vic"
 - b. Tyco/Grinnell; Style 672
 - c. Anvil/Gruvlok; Style 6400
 - d. Apollo- Shurjoint; Style C305
 - e. Substitutions: Not Permitted.
 2. Couplings 2 inches thru 8 inches shall be installation ready wrought copper fittings conforming to ASTM B75/B75M or ASTM B-152, angle-pattern bolt pads to provide rigidity, complete with a pressure responsive synthetic rubber Grade "P" Fluoroelastomer compound gasket with red and blue color code, rated from 0 degrees F to +180 degrees F, with plated nuts and bolts to secure unit together.
 3. If rigid couplings are provided by Tyco Grinnell or Anvil Gruvlok, bolt pads must have equal gaps on each side and a torque wrench must be used to attain the manufacturer's documented torque rating, this will be verified by the engineer's field representative.
 4. Gaskets by Anvil Gruvlok, in copper applications, must be lubricated (inside and out) with Gruvlok Xtreme Lubricant.
 5. Option to fittings used for tees and outlets in grooved piping systems may be mechanical tee type consisting of a cast bronze upper housing with female NPT threaded outlet and locating collar, ductile iron lower housing coated with copper-colored enamel and synthetic rubber gasket.
 6. All grooved end couplings and fittings shall be tested and certified to conform to ASTM F1476-93. Grooves must be rolled and must meet ANSI/AWWA C606.
 7. The use of mechanical couplings may not be utilized as a means of expansion regardless of manufacturer.
 8. Flaring of tube and fitting ends to IPS dimensions will not be allowed.
- C. Copper Press Fittings:
1. Material:
 - a. Press Fittings: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM. All fittings shall be lead free and conform to NSF-61-G.
 2. Installation: Copper press fittings shall be made in accordance with the manufacturers installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fittings alignment shall be checked against the mark on the tubing to assure the tubing is fully inserted into the fitting. The joints shall be pressed using the tool approved by the manufacturer.
 3. A manufacturer approved tool shall be provided to the owner if using press fittings. New press tool shall be cordless with two lithium ion batteries, charging station and press jaws sizes 1/2", 3/4", 1", 1-1/4", 1-1/2" and 2" in size.
 - a. Pre-approved tool Manufacturers:
 - 1) Ridgid
 - 2) Milwaukee
 - 3) Dewalt
 - 4) Nibco
- D. Polypropylene:
1. Manufacturers:
 - a. Aquatherm

- b. Nupi Americas - Niron
 - c. Substitutions: See Section 01 6000 - Product Requirements
2. Pipe shall be manufactured from a PP-R or PP-RCT resin meeting the short-term properties and long-term strength requirements of ASTM F 2389. The pipe shall contain no rework or recycled materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipe shall be made in a three layer extrusion process. Domestic hot water shall contain a fiber layer (faser) to restrict thermal expansion. All pipe shall comply with the rated pressure requirements of ASTM F 2389. All pipe shall be certified by NSF International as complying with NSF 14, NSF 61, and ASTM F 2389 or CSA B137.11. 2. Aboveground: Polypropylene (PP-R or PP-RCT) piping in SDR 6, 7.4 or 11 based on the required minimum pressure rating and use temperature.
 3. Fittings: Fittings shall be manufactured from a PP-R or PP-RCT resin meeting the short-term properties and long-term strength requirements of ASTM F 2389. The fittings shall contain no rework or recycled materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All fittings shall be certified by NSF International as complying with NSF 14, NSF 61, and ASTM F 2389 or CSA B137.11.
 4. Valves: Valves shall be manufactured in accordance with the manufacturers specifications and shall comply with the performance requirements of ASTM F 2389 or CSA B137.11. The valves shall contain no rework or recycled thermoplastic materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material.
 5. Smoke and Fire Ratings:
 - a. Where indicated on the drawings that a Plenum-rated Piping System is needed, then the pipe shall be pre-insulated or field insulated, and when tested with standard un-insulated fittings per CAN/ULC-S102.2-03 or ASTM E84, the system consisting of wrapped or coated pipe and bare fittings shall have a Flame Spread Classification of less than 25 and Smoke Development rating of less than 50.
 6. Joints:
 - a. Install fittings and joints using socket-fusion, electrofusion, or butt-fusion as applicable for the fitting type. All fusion-well joints shall be made in accordance with the pipe and fitting manufacturer's specifications and product standards.
 - b. Fusion-weld tooling, welding machines, and electrofusion devices shall be as specified by the pipe and fittings manufacturer.
 - c. Prior to joining, the pipe and fittings shall be prepared in accordance with F 2389 and the manufacturer's specifications.
 - d. Joint preparation, setting and alignment, fusion process, cooling times and working pressure shall be in accordance with the pipe and fitting manufacturer's specifications.
 7. Pipe Insulation:
 - a. Where insulation is indicated on the drawings or in these specifications, Aquatherm Advanced pipe with thermal (radiant, conductive, and convective) and vapor barrier insulation shall be provided. The thick wall, self insulating fittings do not require an additional vapor barrier for the piping system to meet this performance level. The thermal barrier is UV resistant, CFC-free, non-porous, non-fibrous, and resist mold growth. The pipe with the integral thermal barrier with standard unprotected fittings shall meet the ASTM E84 and the CAN/ULC S102.2 requirements for a Flame Spread Rating of 25 and Smoke Development rating of 50.

2.03 STORM WATER PIPING

- A. Cast Iron Pipe: ASTM A 74 extra heavy weight. Piping shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

1. Fittings: Cast iron.
 2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
- B. PVC Pipe: ASTM D2665 or ASTM D3034.
1. Fittings: PVC.
 2. Joints: Solvent welded, with ASTM D2564 solvent cement.
- C. Storm piping in return air plenums, chases exposed to plenums and through fire walls shall be cast iron. PVC piping will not be allowed in any of the spaces noted.

2.04 NATURAL GAS PIPING

- A. Polyethylene Pipe: ASTM D 2513, SDR 11.
1. Fittings: ASTM D 2683 or ASTM D 2513 socket type.
 2. Joints: Fusion welded.
 3. Polyethylene pipe shall only be used for buried piping. Install per gas company requirements. Provide a tracer wire.
- B. Steel Pipe: ASTM A 53/A 53M Schedule 40 black. Piping smaller than 1/2 inch NPS will not be allowed.
1. Pipe size 2" and above: Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M , wrought steel welding type.
 2. Pipe size 1-1/2" and below: Joints: NFPA 54, threaded or welded to ASME B31.1.
- C. Provide 1/2 inch elastomeric insulation around all gas piping in walls and through floors.
- D. All gas piping shall be accessible.

2.05 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
1. Ferrous pipe: Class 150 malleable iron threaded unions.
 2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Size Over 1 Inch:
1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
 2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Grooved and Shouldered Pipe End Couplings:
1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
 2. Sealing gasket: "C" shape composition sealing gasket.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.06 PIPE HANGERS AND SUPPORTS

- A. Plumbing Piping - Drain, Waste, Storm, and Vent:
1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable swivel, clevis.
 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 7. Vertical Support: Steel riser clamp.

8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- B. Plumbing Piping - Water, Gas, Compressed Air:
1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable swivel, clevis.
 4. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 7. Structural Supports shall be beam clamps, sloped beam clamps, or strap in strut mount hangers.
 - a. Arrange all mechanical supports to prevent eccentric loading of joists and joist girders. Locate supports at joist panel points.
 - b. 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.
 - c. Unless specifically indicated or approved by Garmann Miller & Associates Inc. do not provide support from roof decks or floor decks.
 8. Vertical Support: Steel riser clamp.
 9. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 10. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
 11. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Copper tubing 1/2 inch to 2 inch: When attached directly to copper piping or tubing, hangers shall be equipped with permanently attached factory liner of high compression factor, chemically treated to resist moisture, abrasion, heat, cold and vermin. Liner shall be felt or equally approvable material, or hangers shall be copper plated. Lined or plated hangers not required when hanger is oversized to cover an insulated line.
- D. Pex Piping 1/2 inch to 3 inch: When suspended piping applications with hangers or unistrut shall have pipe supports installed to provide similar pipe mounting spacing to copper piping. Pipe supports shall be equal to Uponsor model: PEX-a Pipe Support, 9 foot length.

2.07 GLOBE VALVES

- A. Manufacturers:
1. Conbraco Industries / Apollo Valves.
 2. Nibco, Inc.
 3. Crane Co. - Valve Division.
 4. Hammond.
 5. Watts.
 6. Milwaukee Valve Company.
 7. Kitz.
 8. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Up To and Including 2 Inches
1. Valves shall be Class 150 and manufactured in accordance with MSS SP 80; body and bonnet are to be of bronze ASTM B-62. Stems shall be of dezincification-resistant silicone bronze ASTM B-371 or low zinc alloy B-99, non asbestos packing, TFE seat disc and

malleable or ductile iron handwheel. Where higher operating pressures approach 150 PSI, Class 150 union bonnet valves of like construction will be used. Valve ends may be threaded or solder type.

C. 2-1/2 Inches and Larger

1. Valves to be Class 125 manufactured in accordance to MSS SP 85, flanged, bolted bonnet, OS&Y, iron body, bronze trimmed, with body and bonnet conforming to ASTM A-126 class B cast iron. Packing and gaskets to be non-asbestos. Provide chain wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

2.08 BALL VALVES

A. Manufacturers:

1. Apollo Valves; [_____]: www.apollovalves.com/#sle.
2. Conbraco Industries / Apollo Valves.
3. Crane Co. - Valve Division.
4. Hammond.
5. Watts.
6. Milwaukee Valve Company.
7. Jomar Valve
8. Kitz.
9. Substitutions: See Section 01 60 00 - Product Requirements.

B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

C. Valves shall be rated 150 psi CWP and 600 psi non-shock WOG and will have 2 piece cast bronze lead free bodies conforming to NSF-61-G and ISO 6509, TFE seats, full port, separate packnut with adjustable stem packing, anti-blowout stems and chrome plated bronze ball. Valve ends shall have full depth ANSI threads or extended solder connections and be manufactured to comply with MSS SP-110.

1. Valves shall have a permanent marking on valve body identifying valve as lead free in conformance with NSF-61-G.

D. Valve handles shall be lever type, metal handle with epoxy coated finish. Plastic handles will not be approved.

1. Where piping is insulated, ball valves shall be equipped with 2" extended handles of non-thermal conductive material. Also provide a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation. Memory stops, which are fully adjustable after insulation is applied, shall be included.

2.09 PLUG VALVES

A. Manufacturers:

1. Conbraco Industries / Apollo Valves.
2. Crane Co. - Valve Division.
3. Hammond.
4. Watts.
5. Milwaukee Valve Company.
6. Kitz.
7. Homestead
8. Nordstrom
9. Substitutions: See Section 01 60 00 - Product Requirements.

- B. Construction 2-1/2 Inches and Larger: ANSI B16.1, 175 psi CWP, cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

2.10 BUTTERFLY VALVES

- A. Manufacturers:
1. Apollo Valves; [_____]: www.apollovalves.com/#sle.
 2. Victaulic
 3. Conbraco Industries / Apollo Valves.
 4. Hammond Valve.
 5. Crane Valve.
 6. Watts.
 7. Milwaukee Valve Company.
 8. Kitz.
 9. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Valves shall be lug of I.P.S. grooved body style manufactured in accordance with MSS SP-67 rated at least 200 psi non-shock cold water working pressure. Body to have 2 inch extended neck for insulating and to be cast iron or ductile iron. Valve to have aluminum bronze alloy disc with EPDM rubber seat and seals; or EPDM rubber encapsulated disc with polymer coated body. Stem shall be 400 series stainless steel and shall not have exposed stem to disc fasteners. Sizes 2 inch - 6 inch shall be lever operated with 10 position throttling plate; sizes 8 inch and larger shall have gear operators. Lug style and grooved style shall be capable for use as isolation valves and recommended by the manufacturer for dead-end service at full pressure without the need for downstream flanges.

2.11 SWING CHECK VALVES

- A. Manufacturers:
1. Hammond Valve.
 2. Conbraco Industries / Apollo Valves.
 3. Crane Co. - Valve Division.
 4. Watts.
 5. Milwaukee Valve Company.
 6. Kitz.
 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Up to 2 Inches:
1. Valves shall be Y-Pattern swing-type manufactured in accordance with MSS SP-80 Class 150, bronze ASTM B-62 lead free bodies conforming to NSF-61-G with TFE seat disc. Where higher operating pressures approach 150 psi, Class 150 valves of like construction shall be used. Valve ends may be threaded or solder type.
- C. Over 2 Inches:
1. For horizontal lines shall be swing-type manufactured in accordance with MSS SP-71 Class 125, flanged, ASTM A-126 Class B, cast iron body with bronze trim, non-asbestos gasket. For vertical lines or pump discharge, valves shall be wafer or lug style, in line, spring actuated lift check manufactured in accordance with MSS SP-126. Body shall be cast iron ASTM A-126, Class B with stainless steel spring, bronze disc plates, rubber seat

2.12 SPRING LOADED CHECK VALVES

- A. Manufacturers:
1. Hammond Valve.
 2. Conbraco Industries / Apollo Valves.
 3. Crane Valve.
 4. Watts.

5. Milwaukee Valve Company.
 6. Kitz.
 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Class 125, iron body, bronze lead free trim conforming to NSF-61-G , stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.13 RELIEF VALVES

- A. Pressure Relief:
1. Manufacturers:
 - a. Cla-Val Co
 - b. Henry Technologies
 - c. Watts Regulator Company
 - d. Conbraco Industries / Apollo Valves
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
 2. {rs#1} certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.
- B. Temperature and Pressure Relief:
1. Manufacturers:
 - a. Cla-Val Co
 - b. Henry Technologies
 - c. Watts Regulator Company
 - d. Conbraco Industries / Apollo Valves
 - e. Substitutions: See Section 01 60 00 - Product Requirements.
 2. AGA Z21.22 certified, bronze lead free body conforming to NSF-61-G, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME (BPV IV) certified and labelled.

2.14 GAS PRESSURE REGULATOR

- A. Manufacturers:
1. Sensus
 2. Fisher
 3. Equimeter (Invensys).
 4. Rockwell.
 5. Maxitrol.
 6. Substitutions: See Section 01600 - Product Requirements.
- B. All gas pressure regulators shall be installed to meet or exceed the requirements of NFPA 54.
- C. Gas regulators shall be die cast steel diaphragm, stainless steel interchangeable orifices, cast iron body, Buna-N with nylon fabric insert diaphragm.
- D. Main control gas pressure regulators shall provide gas at maximum and minimum capacities indicated to reduce gas line pressure from 2 psi to 7 inch W.C. Refer to Drawings for additional requirements.
- E. Monitoring gas pressure regulator to be same model and construction as Main control gas regulator.
- F. All gas pressure regulators shall be valved to allow for service.
- G. See drawings for Building Gas Regulator installation detail.

2.15 AUTOMATIC GAS SHUT-OFF VALVE - SCIENCE

- A. Manufacturers:
1. ASCO
 2. Fossil.

3. Karl Dungs, Inc.
 4. Magnatrol Valve Corp.
 5. Substitutions: See Section 01600 - Product Requirements.
- B. Free handle manual reset shut-off valve. The free handle shall not open the valve until the solenoid is energized, allowing the lever to engage.
 - C. Valve shall be same size as supply line to valve.
 - D. The valve shall operate on 120 volts.

2.16 STRAINERS

- A. Manufacturers:
 1. Mueller.
 2. Armstrong International, Inc.
 3. Nibco, Inc
 4. Sarco.
 5. Hoffman.
 6. Metalflex.
 7. Conbraco Industries / Apollo Valves
 8. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Size 2 inch and Under:
 1. Threaded bronze body, lead free conforming to NSF-61-G, for 200 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
 2. Class 125, threaded bronze lead free body or iron body 400 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 1-1/2 inch to 4 inch:
 1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Sanitary, storm, and vent piping in return air plenums, chases exposed to plenums and through fire walls shall be cast iron. PVC piping will not be allowed in any of the plenum spaces noted.
- C. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- D. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- E. Install piping to maintain headroom, conserve space, and not interfere with use of space. Coordinate all installation with all other trades.
- F. Group piping whenever practical at common elevations.
- G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

- H. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- I. Provide access where valves are not exposed. Coordinate size and location of access doors with Section 08 3100.
- J. Establish elevations of buried piping outside the building to ensure not less than 4 ft of cover for domestic water piping.
- K. Install vent piping penetrating roofed areas to maintain integrity of roof assembly and insulate roof penetration with spray foam. Vent piping termination through the roof to be cast iron no-hub. Paint vent through roof to color as selected by Architect/Engineer.
- L. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- M. Provide support for utility meters in accordance with requirements of utility companies.
- N. Excavate in accordance with Section 31 23 16.
- O. Install valves with stems upright or horizontal, not inverted. All valve handles shall be easily accessible.
- P. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood or turn down elbow with insect screen.
- Q. Install water piping to ASME B31.9.
- R. Test all gas piping per NFPA 54.
- S. All exposed gas piping located below the ceiling in kitchen and in other exposed areas shall be painted yellow or painted grey when exposed on the exterior of the building and properly identified. Minimum of three coats of paint is required. Refer to section 22 0553 for proper identification.
- T. Unions and valves are not permitted in the gas piping in a return air plenum.
- U. Provide 1/2" elastomeric insulation around all piping in walls and through floors.
- V. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- W. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- X. Sleeve pipes passing through partitions, walls and floors.
- Y. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- Z. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Bent hanger rods will not be allowed. Provide swivel type clamps to avoid bent hanger rods.
 - 3. Support horizontal piping as scheduled. No pipe or duct shall be hung from another pipe, pipes or electrical conduit.

4. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
5. Place hangers within 12 inches of each horizontal elbow.
6. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
7. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
8. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
9. Provide copper plated hangers and supports for copper piping.
10. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
11. Support cast iron drainage piping at every joint.

3.04 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install press fittings using only the manufacturers approved press fitting equipment.
- C. Install unions downstream of valves and at equipment or apparatus connections.
- D. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- E. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers. Gate valves will not be allowed on this project.
- F. Install globe valves for throttling, bypass, or manual flow control services.
- G. Provide check valves on cold water inlet to water heater, on hot water return connection to cold water line and as shown on drawings.
- H. Provide plug valves in natural gas systems for shut-off service. Gas valves 2" and smaller may be 1/4 turn ball valves.

3.05 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope.

3.06 TESTING AND REPAIR

- A. Upon completion of each respective piping/ductwork system, but prior to insulating, covering, or backfilling, each system shall be thoroughly cleaned and flushed to remove construction dirt and foreign matter.
- B. Test Piping as Specified Herein
 1. No piping work shall be concealed or covered until it has been inspected and approved by the project inspector, who shall be notified when the Work is ready for inspection. Work shall be completely installed and tested as required by this Contract and Ordinances of the local Municipality and shall be leaktight to the satisfaction of those making the inspection and the Architect/ Engineer.
 2. In general, pressure tests shall be applied to piping. In no case shall piping be subject to pressure exceeding its rating. Defective work shall be promptly repaired or replaced and test shall be repeated until the particular system and component parts thereof receive approval of the Architect/Engineer.
 3. Provide temporary equipment for testing, including pump, blower, and gauges. Test piping system before insulation is installed and remove control devices before testing. Test each natural section of each piping system independently, but do not use piping system valves or to isolate sections where test pressure exceeds valve pressure rating.

4. Repair piping system sections which fail required piping test by disassembly and reinstallation, using new materials to extent required to overcome leakage. Do not use chemicals, stopleak compounds, mastics, or other temporary repair methods.
 5. Drain test water from piping systems after testing and repair work has been completed.
 6. Pressure for Testing of Piping Systems shall be as follows:
 - a. Domestic Cold Water, Hot Water, and Non-Potable Water Piping
 - 1) Piping shall be tested and results approved by Architect/Engineer prior to application of insulation.
 - 2) Piping system shall be capped and subjected to a static water pressure of 50 psig above operating pressure and a minimum of 125 psig, and pressure maintained for 4 hours with no leaks or loss in pressure.
 - 3) Test source shall be isolated before conducting pressure tests.
 - b. Sewer, Soil, and Waste Piping
 - 1) Soil and waste piping shall be plugged and subjected to not less than a 10 foot head of water. Water column shall be maintained for 2 hours with no leaks.
 - 2) Where subject to freezing, use air or smoke test for not less than 30 minutes and as required by code.
 - c. Natural Gas Piping
 - 1) Per NFPA #54, state and local utility codes.
 7. Accurately record and report methods of testing, times, and dates of test, witnesses to the test, and the results of the test. Test reports shall be neatly typewritten on standard 8-1/2 inch by 11 inch sheets and submitted in 5 copies to Architect/Engineer for approval within 5 days after test has been performed.
- C. Damage resulting from tests shall be repaired or damaged materials replaced, to satisfaction of Architect/Engineer, and at no cost to Owner.

3.07 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect water distribution system in accordance with Section 33 01 10.58.
- B. Prior to starting work, verify system is complete, flushed and clean.
- C. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.08 SERVICE CONNECTIONS

- A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with approved strainer, reduced pressure backflow preventer and shutoff valves.
- C. Provide new gas service as noted on construction documents. Coordinate requirements with Dominion East Ohio Gas Company.

3.09 SCHEDULES

- A. Pipe Hanger Spacing:
 - 1. Metal Piping:
 - a. Pipe Size: 1/2 inches to 1-1/4 inches:
 - 1) Maximum Hanger Spacing: 6.5 ft.
 - 2) Hanger Rod Diameter: 3/8 inches.
 - b. Pipe Size: 1-1/2 inches to 2 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 3/8 inch.
 - c. Pipe Size: 2-1/2 inches to 3 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 1/2 inch.
 - d. Pipe Size: 4 inches to 6 inches:
 - 1) Maximum Hanger Spacing: 10 ft.
 - 2) Hanger Rod Diameter: 5/8 inch.
 - 2. Copper Piping
 - a. Pipe size: Up to 1 inch
 - 1) Maximum hanger spacing: 5 ft.
 - 2) Hanger rod diameter: 3/8 inch
 - b. Pipe size: 1-1/4 inch to 2 inch
 - 1) Maximum hanger spacing: 8 ft.
 - 2) Hanger rod diameter: 3/8 inch
 - c. Pipe size: 2-1/2 inch
 - 1) Maximum hanger spacing: 9 ft.
 - 2) Hanger rod diameter: 1/2 inch
 - d. Pipe size: 3 inch to 4 inch
 - 1) Maximum hanger spacing: 10 ft.
 - 2) Hanger rod diameter: 1/2 inch
 - 3. Plastic Piping:
 - a. All Sizes:
 - 1) Maximum Hanger Spacing: 6 ft.
 - 2) Hanger Rod Diameter: 3/8 inch.

END OF SECTION

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**SECTION 22 10 06
PLUMBING PIPING SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drains.
- B. Floor drains.
- C. Roof drains.
- D. Cleanouts.
- E. Water hammer arrestors / Shock Absorbers.
- F. Mixing valves.
- G. Trap Primers.
- H. 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 Owner'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. Roof Drains (RD):
 - 1. Body: Lacquered cast iron with sump.
 - 2. Strainer: Removable polyethylene dome with vandal proof screws.
 - 3. Accessories: Coordinate with roofing type, refer to Section 07 5300:
 - a. Membrane flange and membrane clamp with integral gravel stop.
 - b. Adjustable under deck clamp.
 - c. Dual roof drain deck flange and sump receiver.
 - d. Waterproofing flange.
 - e. Leveling frame.
 - f. Adjustable extension sleeve for roof insulation.
 - g. Perforated or slotted ballast guard extension for inverted roof.
- C. Downspout Nozzles:
 - 1. Bronze round with straight bottom section.
 - 2. Alternate: Corrosion resistant aluminum alloy, round, powder coated. Color to be selected by architect.
- 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.

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. Acom
 - 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. Main Buildign electronic mixing valve with programmable thermal disinfection. ASSE 1017 approved for point of distribution with low-lead brass body(<0.25% lead content) certified by and listed by ICC-ES, low-lead brass, chrome-plated ball, PTFE ball seats and peroxide-cured EPDM hydraulic seals. Provided with 3-wire 24 VAC (50/50 Hz) floating electric actuator, fail-in-place with integral position indicator, self-extinguishing VO cover and 31 ½" (0.8 m) electric power supply cable. Controller, LCD user interface/display requires 24 VAC (50/60 Hz) power supply with self-extinguishing ABS, color white RAL 1467 housing and self-extinguishing SAN, smoked transparent cover. Relay contact rating: 5 A resistance, 2 Inductance / 24 Volt. The user interface, with choice of 11 languages, shall provide a set of programs for selectable automatic scheduling circuit thermal disinfection to kill Legionella, configurable via keypad, or local or remote controller; with additional functions of daily ball rotation cycle, flush valve relay output, data logging (40 day FIFO loop buffer), alarming, and status indication. Package includes two stainless steel temperature sensors(for mixed outlet water temperature and return water temperature, strap-on style, for recirculation), each with NTC sensitive elements and working temperature range 14degrees F to 260 degrees F (minus 10 degrees C to 125 degrees C), resistance 1000ohms at 77 degrees F (25 degrees C), time constant 2.5. Package also includes one 50VA, Class 2, 24 VAC transformer.
 3. Main Building Thermostatic Mixing Valve: Rough Bronze finish, cast brass lead free body conforming to NSF-61-G, stainless steel or copper alloy bellows, integral temperature adjustment. Mixing valve must conform to ASSE 1017.
 - a. Valve shall have permanent markings identifying valve as lead free.
 4. Lockerroom Thermostatic Mixing Valve: Polished chrome finish, cast brass , stainless steel or copper alloy bellows, integral temperature adjustment. Mixing valve must conform to ASSE 1016.
 - a. Cabinet: 16 gage stainless steel, continuous piano hinge for recessed mounting with keyed lock. Install where denoted on drawings.
 5. 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.
 6. 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. Carpet markers must be installed for cleanouts in all carpeted areas.
- I. 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.
- J. Install mixing valves at +5'-0" above finished floor.
- K. Install lavatory thermostatic mixing valves serving single lavs directly below the lavatory. Locate as high as possible below lavatory.
- L. Install lavatory thermostatic mixing valves serving multiple lavs above lay-in ceiling. Locate as to provide maintenance access.
- M. Install trap primers for floor drains per state codes. Refer to detail on drawings for installation requirements.
- N. 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

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**SECTION 22 40 00
PLUMBING FIXTURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush Valve Water closets.
- B. Lavatories.
- C. Service sinks.

1.02 RELATED REQUIREMENTS

- A. Section 06 41 00 - Architectural Wood Casework: Preparation of counters for sinks and lavatories.
- B. Section 07 90 05 - DO NOT USE - Joint Sealers: Seal fixtures to walls and floors.
- C. Section 11 40 00 - Foodservice Equipment: Food service sinks.
- D. Section 11 53 00 - DO NOT USE - Laboratory Equipment: Laboratory sinks.
- E. Section 22 10 05 - Plumbing Piping.
- F. Section 22 10 06 - Plumbing Piping Specialties.
- G. 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 A112.18.1 - Plumbing Supply Fittings 2018, with Errata.
- D. ASME A112.19.2 - Ceramic Plumbing Fixtures 2018, with Errata.
- E. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks 2022.
- F. ISFA 2-01 - Classification and Standards for Solid Surfacing Material 2013.
- G. NEMA LD 3 - High-Pressure Decorative Laminates 2005.
- H. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- I. 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 Owner'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. Manual Flush Valves: ASME A112.19.2; exposed chrome plated, diaphragm or piston type with oscillating handle, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker
 - 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 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. Sloan Valve Company
 9. 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. Manual Lavatory Faucet
 - a. ASME A112.18.1; chrome plated brass/lead free in accordance with NSF-61-G, supply fitting with open grid strainer, 1/4 turn ceramic disc valving, water economy aerator, ADA indexed handles, lever type. All removable parts of faucet shall be vandal resistant.
 - 1) Supply Faucet Centers: 4 inch
 - 2) Water Consumption: 0.35 gpm
 3. Sensor Operated Lavatory Faucet:
 - a. ADA Compliant, sensor activated, battery powered, 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 when battery is installed, cover-plate for 4" centers.
 - 1) Supply Faucet Centers: 4 inch
 - 2) Water Consumption: 0.5 gpm 0.35 gpm

4. 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: 0.35 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.

2.04 SERVICE SINKS

- A. Manufacturers:
 1. Acorn Engineering Company; [_____]: www.americanstandard-us.com/#sle.
 2. Zurn Industries, Inc:
 3. E. L. Mustee & Sons, Inc.
 4. Fiat.
 5. Swan.
 6. Willoughby, Inc.
 7. Stern Williams Products
 8. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Floor Service Sink:
 1. 24 x 24 x 10 inch high terrazzo, floor mounted, drop front, 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

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Division 23

Heating, Ventilating and
Air-Conditioning (HVAC)

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**SECTION 23 05 01
MECHANICAL 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. Supervision and cooperation
- K. Coordination drawings
- L. Maintenance and operating manuals
- M. 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. Refer to Section 07 8400 - Firestopping. Electrical Contractor shall provide submittals for fire stopping based on Section 07 8400.
- 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 Garman Miller & Associates Inc. do not provide support from roof decks.
- F. Related Work Specified Elsewhere
 - 1. Firestopping is Work of this Section though fire barrier sealants (firestopping) for walls and floors are specified in Section 07 8400. Contractors are responsible for proper sizing of their sleeves and core-drilled holes so that they are at least 1-1/2 inches larger in diameter than the penetrating items. Schedule 40 steel sleeves and core-drilled holes made excessively large or made and not used, will be firestopped and charged to the Contractor who was responsible.
- G. Related Work by Others
 - 1. Motors which are shipped loose from the mechanical equipment shall be installed as Work under Division 26, Electrical, or other trades as may be required, at the expense of the Contractor furnishing the loose motor(s).
 - 2. Unless otherwise stipulated under a specific Section of this Division, motor disconnects and starters shall be provided as Work under Division 26, Electrical.
 - 3. 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.
- H. 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. This section describes a base bid product; refer to Section for an alternative product.
- B. This section describes an alternative product; refer to Section for the base bid product.

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. AGA American Gas Association
 - 2. ANSI American National Standards Institute
 - 3. ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers
 - 4. ASME American Society of Mechanical Engineers
 - 5. AWS American Welding Society
 - 6. AWWA American Water Works Association
 - 7. CISPI Cast Iron Soil Pipe Institute
 - 8. NFPA National Fire Protection Association
 - 9. OSHA Occupational Safety and Health Act
 - 10. SMACNA Sheet Metal and Air Conditioning Contractors National Association
 - 11. 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. NFPA 54 - National Fuel Gas Code.
 - 7. National Board of Fire Underwriters
 - 8. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 1993 (and Revision 1,2,3).
 - 9. Other Codes and Standards as specifically noted in each Section of the Specifications.
 - 10. 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 Owner'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 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.
- G. Piping systems shall be installed by workmen having skills acquired by working at the trade which is recognized as necessary for competency.
- H. Pressure piping systems installed shall conform to the requirements of the State piping and welding codes where applicable.

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 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.

1.09 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.

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. Sheet metal sleeves shall be fabricated from galvanized sheet metal and shall be of no less than 18 gauge metal for 3 inch diameter and smaller, 16 gauge metal for 4 inch to 6 inch diameter, and 14 gauge metal for 6 inch diameter and larger.
- B. Steel pipe sleeves shall be fabricated from Schedule 40 galvanized steel pipe.
- C. Sleeves for copper piping shall be of compatible material to prevent interaction of piping materials.

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. Alignment of motors, that are factory coupled or mounted and field coupled and mounted, shall be performed by the equipment manufacturer and shall be rechecked after connections have been made and after 48 hours of operation in designed service.
 - 2. 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. 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.
- D. 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 insulated piping passes through fire barriers, stop insulation at barrier for fire barrier penetration seal.
 9. Where piping passes through non-fire rated, or non waterproof, partitions, floors, and walls, apply pipe insulation continuous through pipe sleeves.
 10. Do not install sleeves through suspended ceilings.
 11. Caulk non-fire rated sleeves with sealant.
- E. 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.

F. 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 CONCRETE HOUSEKEEPING PADS

- A. Contractor shall refer to Specification Section 03 3000 for requirements of concrete housekeeping pads.

3.03 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.
- B. The air handling units may be used for temporary heating. If units are used for temporary heating the heat wheel section shall be completely blanked off on both the supply and exhaust side to prevent any air, dust, etc. from passing through heat wheel. Any damage to the heat wheel due to unit use for temporary heating shall be replaced at no additional cost to the owner.

3.04 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.

3.05 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.

3.06 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 05 03
WORK IN EXISTING BUILDING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cutting and patching of existing material
- B. Protection of existing conditions
- C. Demolition work
- D. Existing facility operation

1.02 RELATED REQUIREMENTS

- A. Section 01 3329 - Sustainable Design Reporting
- B. Section 02 4100 - Demolition
- C. Section 23 0501- Mechanical Materials and Methods.

1.03 QUALITY ASSURANCE

- A. This Contractor shall be responsible for cutting and patching of existing walls, roofs, floors, and ceilings required for the installation of new HVAC work. Openings shall be neatly drilled or cut.
- B. Patching shall be performed by a workman skilled in the trade involved, and patch work shall match the existing surface and finished in a manner completely acceptable to the Architect.
- C. New Work in finished spaces of existing buildings shall be installed concealed unless directed by Architect/Engineer to run exposed.
- D. Contractor shall visit the Project and verify existing conditions prior to bidding.
- E. Protect existing work, equipment, fixtures, and systems from damage.
- F. Contractor shall take necessary steps to protect the building and all interior finishes from damage during the installation of his work.
- G. The Contractor(s) shall perform demolition work as shown on the Drawings and as specified herein or as may otherwise be required.
 - 1. HVAC items to be removed shall be as indicated on Drawings.
 - 2. The Owner may select items of equipment and material he wishes to retain and these items shall be moved to the location he designates. Other items shall be removed from the premises. Contractor shall verify with owner before any equipment is removed from the premises.
- H. The continuity of operation of existing facilities during construction of the new Work shall be required. The actual length of time for an interruption shall be held to an absolute minimum. At least 48 hours in advance of an installation of new services, submit a specific plan to the Engineer and the Owner detailing the nature and estimated duration of the interruption and the method of procedure. Do not proceed with an interruption of service without the Owner's authorization.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Not Applicable.

PART 3 EXECUTION

3.01 CLEANING

- A. The contractors shall clean all areas of debris and items to be disposed of in all areas where work is performed under each contract.

END OF SECTION

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**SECTION 23 05 48
VIBRATION AND SEISMIC CONTROLS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vibration isolators.

1.02 RELATED REQUIREMENTS

- A. Section 01 3329 - Sustainable Design Reporting
- B. Section 03 30 00 - Cast-in-Place Concrete.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Kinetics Noise Control, Inc
- B. Mason Industries
- C. Vibration Eliminator Company, Inc
- D. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. General:
 - 1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
 - 2. Steel springs to function without undue stress or overloading.

2.03 VIBRATION ISOLATORS

- A. General Requirements:
 - 1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
- B. Open Spring Isolators:
 - 1. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection. Color code springs for load carrying capacity.
 - 2. Spring Mounts: Provide with leveling devices, minimum 0.25 inch thick neoprene sound pads, and zinc chromate plated hardware.
 - 3. Sound Pads: Size for minimum deflection of 0.05 inch; meet requirements for neoprene pad isolators.
 - 4. For Exterior and Humid Areas: Hot dipped galvanized housings and neoprene coated springs.
- C. Restrained Open Spring Isolators:
 - 1. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection. Color code springs for load carrying capacity.
 - 2. Spring Mounts: Provide with leveling devices, minimum 0.25 inch thick neoprene sound pads, and zinc chromate plated hardware.
 - 3. Sound Pads: Size for minimum deflection of 0.05 inch; meet requirements for neoprene pad isolators.
 - 4. Restraint: Provide heavy mounting frame and limit stops.
 - 5. For Exterior and Humid Areas: Hot dipped galvanized housings and neoprene coated springs.
- D. Spring Hangers:

1. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection. Color code springs for load carrying capacity.
 2. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators.
 3. Misalignment: Capable of 20 degree hanger rod misalignment.
 4. For Exterior and Humid Areas: Hot dipped galvanized housings and neoprene coated springs.
- E. Neoprene Pad Isolators: Isolation pads shall be cross ribbed, true elastomer-in-shear using alternately higher and lower ribs to provide effective vibration isolation, and shall be molded using 2500 PSI tensile strength, oil resistant compounds with no color additives.
1. Rubber or neoprene waffle pads.
 - a. Hardness: 65 durometer.
 - b. Thickness: Minimum 3/8 inch.
 - c. Maximum Loading: 120 psi.
 - d. Rib Height: Maximum 0.7 times width.
 2. Configuration: Single layer.
 3. Isolator pad to be equal to Kinetics model NPD.
- F. Rubber Mount or Hanger: Molded rubber designed for 0.4 inch deflection with threaded insert.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Secure fasteners according to manufacturer's recommended torque settings.
- D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

3.02 INSTALLATION - GENERAL

- A. Install in accordance with manufacturer's instructions.
- B. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.
- C. Provide vibration isolators for all rotating, motor driven, reciprocating, and vibrating equipment.
 1. Provide spring hangers for all hanging fans and fan powered Variable Air Volume boxes.
- D. Support piping connections to equipment mounted on isolators using isolators or resilient hangers to nearest flexible pipe connector.
- E. Provide neoprene pads at the following locations:
 1. Under the entire support of air source heat pump units.
 2. Under entire support of water source heat pump units.
 3. Under each support for the split system technology closet air conditioning units.

END OF SECTION

**SECTION 23 05 53
HVAC IDENTIFICATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe markers.

1.02 RELATED REQUIREMENTS

- A. Refer to Section 01 1200 - Multiple Contract Summary for Work under other contracts.
- B. Section 09 91 23 - Interior Painting: Identification painting.
- C. Section 23 2113 - Hydronic Piping
- D. Section 23 3100 - HVAC Ducts and Casings

1.03 REFERENCE STANDARDS

- A. 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 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Champion America, Inc: www.Champion-America.com.
- C. Seton Identification Products: www.seton.com/aec.
- D. Brimar, Inc.
- E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 NAMEPLATES

- A. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: Black.

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 sytem 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. HHS - Heating Water Supply
 - 2. HHR - Heating Water Return

3. CHWS - Chilled Water Supply
 4. CHWR - Chilled Water Return
 5. HPWS - Heat Pump Water Supply
 6. HPWR - Heat Pump Water Return
 7. REFRIGERANT - Refrigerant
- 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 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 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
 2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
 3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
 4. Ductwork and Equipment: 2-1/2 inch high letters.
- B. Stencil Paint: As specified in Section 09 91 23, semi-gloss enamel, colors complying with ASME A13.1.

2.05 PIPE MARKERS

- A. Color: 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.

2.06 DUCT MARKERS

- A. Provide pressure sensitive vinyl labels on all ductwork mains installed on this project to identify the basic content, directional flow, and corresponding equipment (i.e. "AHU-B201", "EF-B201", etc.) of the duct. Utilize manufacturer's standard legends such as: Exhaust, Exhaust Air, Intake, Intake Air, Outside Air, Relief, Relief Air, Return Air or Supply Air.

2.07 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. Color code as follows:
1. HVAC Equipment: Yellow.
 2. Fire Dampers and Smoke Dampers: Red.
 3. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 91 23 for stencil painting.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Apply stencil painting in accordance with Section 09 91 23.
- D. Install plastic pipe markers in accordance with manufacturer's instructions.
- E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- G. Identify air handling units, pumps, heat pumps, heat transfer equipment, boilers, chillers, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- H. Identify control panels and major control components outside panels with plastic nameplates or aluminum nameplates.
- I. Identify airflow monitoring stations, carbon dioxide sensors, air temperature sensors, and other measuring devices used by the BAS. Tag name shall match the nomenclature used on the drawings and the computer graphics.
- J. Identify valves in main and branch piping with tags.
- K. Identify air terminal units and radiator valves with numbered tags.
- L. 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. 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, and insure there is at least one marker per pipe in every room.
- M. Install ductwork with stencilled painting. Identify Air Handling Unit Tag the ductwork is connected to, type of ductwork (ie supply, exhaust, return), and direction of flow. Label a minimum of every 20 feet. Ductwork downstream of VRV fan coil units and VAV fan coil units is not required to be tagged.
- N. Provide ceiling tags to locate valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.
- O. Identify variable frequency drives with plastic nameplate denoting the piece of equipment it is operating.

END OF SECTION

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**SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Testing, adjustment, and balancing of refrigerating systems.
- C. Measurement of final operating condition of HVAC systems.
- D. Sound measurement of equipment operating conditions.
- E. Vibration measurement of equipment operating conditions.
- F. Commissioning activities.

1.02 RELATED REQUIREMENTS

- A. Section 01450 Quality Control and 01451 Testing Laboratory Services.
- B. Section 01 43 00 - Quality Assurance: Employment of testing agency and payment for services.

1.03 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition 2016.
- B. AABC MN-1 - National Standard for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems; Associated Air Balance Council; 2002.
- C. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems 2008, with Errata (2019).
- D. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems 2015, with Errata (2017).
- E. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing 2002.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Submit to Architect.
 - 2. Submit six weeks prior to starting the testing, adjusting, and balancing work.
 - 3. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - d. Final test report forms to be used.
 - e. Procedures for formal deficiency reports, including scope, frequency and distribution.
- C. Field Logs: Submit at least once a week to Commissioning Authority and Gammann/Miller and Associates.
- D. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.

- E. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
 - 1. Submit under provisions of Section 01 43 00.
 - 2. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 3. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.
 - 4. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
 - 5. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
 - 6. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 7. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 8. Units of Measure: Report data in I-P (inch-pound) units only.
 - 9. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty prior to commencing system balance.
 - 10. Test Reports: Indicate data on AABC MN-1 forms, forms prepared following ASHRAE Std 111, NEBB forms, or forms containing information indicated in Schedules.
 - 11. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Project Engineer: Garmann/Miller Architects-Engineers.
 - g. Project Contractor.
 - h. Project altitude.
 - i. Report date.
- F. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting and balance dampers, control dampers, etc.

1.05 QUALITY ASSURANCE

- A. Perform total system balance in accordance with AABC MN-1, ASHRAE Std 111, or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.
 - 1. Maintain one copy of each document on site.
- B. TAB Agency Qualifications: Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum three years experience certified by AABC.

1.06 SEQUENCING AND SCHEDULING

- A. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.

1.07 WARRANTY

- A. Furnish AABC National Performance Guaranty for this project.

PART 3 EXECUTION

2.01 GENERAL REQUIREMENTS

- A. The TAB contractor to be hired by the Division 23 mechanical contractor.
- B. The Division 23 mechanical contractor shall be responsible to coordinate equipment startup and any required equipment adjustments/modifications during balancing with the TAB

contractor. All this associated time and materials shall be provided by the Division 23 contractor at no additional cost to the project.

- C. Perform total system balance in accordance with one of the following:
 - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 - 2. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
 - 3. SMACNA (TAB).
 - 4. Maintain at least one copy of the standard to be used at project site at all times.
- D. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- E. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- F. TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 - 2. Having minimum of three years documented experience.
 - 3. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
 - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.
- G. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

2.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire, smoke and volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.
 - 12. Hydronic systems are flushed, filled, and vented.
 - 13. Pumps are rotating correctly.
 - 14. Proper strainer baskets are clean and in place.
 - 15. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of conditions.

2.03 PREPARATION

- A. Provide additional balancing devices as required.

2.04 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

2.05 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
 - 1. Running log of events and issues.
 - 2. Discrepancies, deficient or uncompleted work by others.
 - 3. Contract interpretation requests.
 - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- F. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
- G. Seasonal Testing: If initial TAB procedures were not performed during near peak summer and winter conditions, perform additional testing, inspecting and adjusting during near peak summer or winter conditions.
- H. 10 Month Warranty Walk: TAB to perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to report unusual conditions with recommendation of adjustments. TAB Contractor shall allow two days for this work.

2.06 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.
- M. For variable speed fans, fans and motor pulleys shall be adjusted or replaced if required so that the motor is fully loaded at 100% speed. Balance to design airflow by adjusting maximum variable speed drive output below 100%.

2.07 SCOPE

- A. Test, adjust, and balance the following:
 - 1. Packaged Roof Top Heating/Cooling Units.
 - 2. Computer Room Air Conditioning Units.
 - 3. Terminal Heat Transfer Units.
 - 4. Fans.
 - 5. Air Filters.
 - 6. Air Inlets and Outlets.

2.08 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 - 1. Manufacturer.
 - 2. Model/Frame.
 - 3. HP/BHP.
 - 4. Phase, voltage, amperage; nameplate, actual, no load.
 - 5. RPM.
 - 6. Service factor.
 - 7. Starter size, rating, heater elements.
 - 8. Sheave Make/Size/Bore.
- B. V-Belt Drives:
 - 1. Identification/location.
 - 2. Required driven RPM.
 - 3. Driven sheave, diameter and RPM.
 - 4. Belt, size and quantity.
 - 5. Motor sheave diameter and RPM.
 - 6. Center to center distance, maximum, minimum, and actual.
- C. Cooling Coils:
 - 1. Identification/number.
 - 2. Location.
 - 3. Service.
 - 4. Manufacturer.
 - 5. Air flow, design and actual.
 - 6. Entering air DB temperature, design and actual.
 - 7. Entering air WB temperature, design and actual.
 - 8. Leaving air DB temperature, design and actual.
 - 9. Leaving air WB temperature, design and actual.
 - 10. Water flow, design and actual.
 - 11. Water pressure drop, design and actual.
 - 12. Entering water temperature, design and actual.

13. Leaving water temperature, design and actual.
 14. Air pressure drop, design and actual.
- D. Heating Coils:
1. Identification/number.
 2. Location.
 3. Service.
 4. Manufacturer.
 5. Air flow, design and actual.
 6. Water flow, design and actual.
 7. Water pressure drop, design and actual.
 8. Entering water temperature, design and actual.
 9. Leaving water temperature, design and actual.
 10. Entering air temperature, design and actual.
 11. Leaving air temperature, design and actual.
 12. Air pressure drop, design and actual.
- E. Air Moving Equipment:
1. Location.
 2. Manufacturer.
 3. Model number.
 4. Serial number.
 5. Arrangement/Class/Discharge.
 6. Air flow, specified and actual.
 7. Return air flow, specified and actual.
 8. Outside air flow, specified and actual.
 9. Total static pressure (total external), specified and actual.
 10. Inlet pressure.
 11. Discharge pressure.
 12. Sheave Make/Size/Bore.
 13. Number of Belts/Make/Size.
 14. Fan RPM.
- F. Return Air/Outside Air:
1. Identification/location.
 2. Design air flow.
 3. Actual air flow.
 4. Design return air flow.
 5. Actual return air flow.
 6. Design outside air flow.
 7. Actual outside air flow.
 8. Return air temperature.
 9. Outside air temperature.
 10. Required mixed air temperature.
 11. Actual mixed air temperature.
 12. Design outside/return air ratio.
 13. Actual outside/return air ratio.
- G. Exhaust Fans:
1. Location.
 2. Manufacturer.
 3. Model number.
 4. Serial number.
 5. Air flow, specified and actual.

6. Total static pressure (total external), specified and actual.
 7. Inlet pressure.
 8. Discharge pressure.
 9. Sheave Make/Size/Bore.
 10. Number of Belts/Make/Size.
 11. Fan RPM.
- H. Duct Traverses:
1. System zone/branch.
 2. Duct size.
 3. Area.
 4. Design velocity.
 5. Design air flow.
 6. Test velocity.
 7. Test air flow.
 8. Duct static pressure.
 9. Air temperature.
 10. Air correction factor.
- I. Duct Leak Tests:
1. Description of ductwork under test.
 2. Duct design operating pressure.
 3. Duct design test static pressure.
 4. Duct capacity, air flow.
 5. Maximum allowable leakage duct capacity times leak factor.
 6. Test apparatus:
 - a. Blower.
 - b. Orifice, tube size.
 - c. Orifice size.
 - d. Calibrated.
 7. Test static pressure.
 8. Test orifice differential pressure.
 9. Leakage.
- J. Air Distribution Tests:
1. Air terminal number.
 2. Room number/location.
 3. Terminal type.
 4. Terminal size.
 5. Area factor.
 6. Design velocity.
 7. Design air flow.
 8. Test (final) velocity.
 9. Test (final) air flow.
 10. Percent of design air flow.
- K. Sound Level Reports:
1. Location.
 2. Octave bands - equipment off.
 3. Octave bands - equipment on.

END OF SECTION

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**SECTION 23 07 13
DUCT INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.
- B. Duct liner.
- C. Insulation jackets.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 23 05 53 - HVAC Identification.
- C. 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 C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation 2014 (Reapproved 2019).
- D. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material) 2019.
- E. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2008.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- G. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
- H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- I. ASTM E 119 (UL 263) - Standard Test Methods for Fire Tests of Building Construction and Materials.
- J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.
- K. 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.

2.03 GLASS FIBER, RIGID

- 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 C 612; rigid, board.
 - 1. 'K' Value: 0.27 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Minimum 3.0 PCF Density
 - 3. Maximum Service Temperature: 450 degrees F.
 - 4. Maximum Water Vapor Absorption: 5.0 percent.
- 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.

2.04 DUCT LINER

- A. Manufacturers:
 - 1. Knauf Insulation; Model Atmospheric Duct Liner
 - 2. Johns Manville Corporation; Model Linacoustic RC
 - 3. Owens Corning Corp
 - 4. CertainTeed Corporation;: www.certainteed.com/#sle.
 - 5. Manson
 - 6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Note: Choose the liner type - Elastomeric Foam or Glass Fiber.
- C. Insulation: Non-corrosive, limited combustibility glass fiber complying with ASTM C1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer or acrylic polymer.
 - 1. Fungal Resistance: No growth when tested according to ASTM G21.
 - 2. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
 - 3. Service Temperature: Up to 250 degrees F.
 - 4. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
 - 5. Minimum Noise Reduction Coefficients:
 - a. 1 inch Thickness: 0.45.

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.
- E. Insulate ducts conveying air above ambient temperature:
 - 1. Provide with standard vapor barrier jacket.
 - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- F. External Duct Insulation Application:
 - 1. Provide vapor barrier jacket. Cover with aluminum jacket with seams located on bottom side of horizontal ductwork.
 - 2. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 - 3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
 - 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier mastic.
 - 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

- G. Duct and Plenum Liner Application:
1. Adhere insulation with adhesive for 90 percent coverage.
 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
 3. Seal and smooth joints. Seal and coat transverse joints.
 4. Seal liner surface penetrations with adhesive.
 5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

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.
- B. Exhaust/Relief Ducts Exposed to Outdoor Air:
1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
 2. Rigid Glass Fiber Duct Insulation: 1-1/2 inches thick.
- C. Outside Air Intake Ducts:
1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
 2. Rigid Glass Fiber Duct Insulation: 1-1/2 inches thick.
- D. Plenums/Air Transfers:
1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
 2. Rigid Glass Fiber Duct Insulation: 1-1/2 inches thick.
 3. Flexible Glass Fiber Duct Liner Insulation: 1 inches thick, where denoted on drawings.
 4. Rigid Glass Fiber Duct Liner Insulation: 1 inches thick, where denoted on drawings.
- E. Supply Ducts:
1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
 2. Rigid Glass Fiber Duct Insulation: 1-1/2 inches thick.
 3. Flexible Glass Fiber Duct Liner Insulation: 1 inches thick, where noted on the drawings.
 4. Rigid Glass Fiber Duct Liner Insulation: 1 inches thick, where noted on the drawings.
- F. Supply and Return Ducts in Attic Space:
1. Flexible Glass Fiber Duct Insulation: 2 inches thick.
 2. Rigid Glass Fiber Duct Insulation: 2 inches thick.
- G. Ducts Exposed to Outdoors:
1. Flexible Glass Fiber Duct Insulation: 1-1/2 inches thick.
 2. Rigid Glass Fiber Duct Insulation: 1-1/2 inches thick.
- H. Combustion Air Ducts:
1. Flexible Glass Fiber Duct Insulation: [1-1/2] inches thick.

END OF SECTION

**SECTION 23 07 19
HVAC PIPING INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Flexible removable and reusable blanket insulation.
- C. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 23 0716 - HVAC Equipment Insulation.
- C. Section 23 21 13 - Hydronic Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- C. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019.
- D. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation 2017.
- E. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2020a.
- F. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation 2022a.
- G. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation 2022.
- H. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel 2008 (Reapproved 2018).
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a.
- K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.
- L. 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 that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product property performance, and thickness.

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, RIGID

- A. Manufacturers:
 - 1. Johns Manville Corporation: www.jm.com/#sle.
 - 2. Knauf Insulation
 - 3. Owens Corning Corp
 - 4. Manson.
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum moisture absorption: 5 percent by weight.
- C. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- E. All joints to be sealed with factory-applied, self-seal lap and butt strips.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
 - 1. Aeroflex USA, Inc; Aerocell
 - 2. Armacell LLC
 - 3. K-Flex USA LLC
 - 4. Nomaco
 - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Insulation material shall be an EPDM rubber, flexible, closed-cell elastomeric insulation in tubular or sheet form. The product will be tested for and meet or exceed the requirements defined in ASTM C 534.
- C. EPDM elastomeric insulation material shall be manufactured without the use of CFC's, HFC's or HCFC's.
- D. EPDM elastomeric insulation shall have a flame-spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E 84, for all products through 2" thickness. Product to be suitable for use from -297F to 300F continuous service temperature, per ASTM C 411.
- E. EPDM elastomeric insulation shall have a maximum thermal conductivity of 0.245 Btu-in./h-ft² F at a 75 F mean temperature when tested in accordance with ASTM C 177 or ASTM C 518.
- F. EPDM elastomeric insulation shall have a maximum water vapor transmission of 0.03 perm-inches when tested in accordance with ASTM E 96, Procedure A, latest revision.
- G. Product must exhibit long-term UV resistance, when unfinished in outdoor installations, per ASTM G 7 and ASTM G 90.

- H. EPDM elastomeric insulation must not contribute to external stress corrosion cracking as when tested by ASTM C 692.
- I. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation. Accessories and adhesives shall not detract from any of the system ratings as specified above.
- J. All manufacturers installation requirements and recommendations must be followed.

2.04 JACKETS

- A. PVC Plastic.
 - 1. Manufacturers:
 - a. Knauf
 - b. Owens Corning Corp
 - c. Johns Manville International, Inc:
 - d. Certainteed Corp
 - e. Zeston 2000.
 - f. PROTO PVC Corp.
 - g. Speedline Corp.
 - h. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. Jacket: One or two piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
 - 1. Thickness: 0.016 inch sheet.
 - 2. Finish: Smooth.
 - 3. Joining: Longitudinal slip joints and 2 inch laps.
 - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with the Midwest Insulation Contractors Association (MICA), National Commercial and Insulation Standard.
- C. All insulation shall be applied so that there is no fiberglass exposed to the return air plenum. 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. Exposed Piping: Locate insulation and cover seams in least visible locations.
- E. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- F. Glass fiber insulated pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward

- clinch expanding staples and vapor barrier mastic.
2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- G. For hot piping conveying fluids over 110 degrees F, insulate flanges and unions at equipment.
- H. Glass fiber insulated pipes conveying fluids above ambient temperature.
1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- I. Inserts and Shields:
1. Application: Piping 1 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.
- K. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.
- L. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with PVC or aluminum jacket with seams located on bottom side of horizontal piping.

3.03 SCHEDULE

- A. Cooling Systems:
1. Condensate Drains from Cooling Coils located above ceiling:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: All Sizes
 - (a) Thickness: 1 inch
 - b. Flexible Elastomeric Foam Insulation:
 - 1) Pipe Size Range: All Sizes
 - (a) Thickness: 1/2 inch
 2. Refrigerant Piping:
 - a. Flexible Elastomeric Insulation:
 - 1) Pipe Size Range: 1 inch and under
 - (a) Thickness: 1/2 inch.
 - 2) Pipe Size Range: 1 1/4 inch and above
 - (a) Thickness: 1 inch.

END OF SECTION

**SECTION 23 31 00
HVAC DUCTS AND CASINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ductwork.
- B. Flexible Duct Liner
- C. Duct cleaning.
- D. Testing and Repair

1.02 RELATED REQUIREMENTS

- A. Section 01 3516.01 - Material Documentation Sheet
- B. Section 01 5721 - IAQ Construction and Preoccupancy
- C. Section 01 5721.01 - IAQ Planning Checklist
- D. Section 01 5721.02 - IAQ Inspection Checklist
- E. Section 01 5721.03 - IAQ Log.
- F. Section 01 6116.01 - Accessory Material VOC Content Certification Form.
- G. Section 09 91 13 - Exterior Painting: Weld priming, weather resistant, paint or coating.
- H. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.
- I. Section 23 07 13 - DUCT INSULATION: External insulation and duct liner.
- J. Section 23 33 00 - Air Duct Accessories.
- K. 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. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- E. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems 2021.
- F. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012, 2nd Edition.
- G. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- H. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines 2001.
- I. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual 2012.
- J. ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- K. 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 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Provide required LEED submittals and documentation per Section 01 3000.
- C. Product Data: Provide data for duct materials.
- D. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for systems.
- E. Sheet metal shop coordination drawings shall be provided by the Division 23 mechanical contractor. Refer to Section 23 0501 for coordination drawing requirements.
- F. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK).
- G. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.06 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. Minimum rectangular duct sheet metal gauges, reinforcement and rigidity shall be in accordance with Table 1-5, SMACNA HVAC Duct Construction Standards, First Edition 1985.
- D. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 2 years of documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A standards.

1.08 WARRANTY

- A. Fabric Duct: 10 year product warranty for products supplied for the fabric portion of this system as well as a design and performance warranty.

1.09 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.

1.10 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.
- C. Refer to section 01 5721 - IAQ Construction and Preoccupancy for additional requirements.

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. Fume hood exhaust shall be PVC-coated galvanized steel lock forming quality meeting UL 181, ASTM A 653/A 653/M, G90 (Z275) coating designation. Provide 4-mil PVC coating on the interior of the duct and fittings. Gauges shall be per the latest issue of SMACNA for listed pressure requirements.
 - 1. Provide Class B seals for all joints.
- C. Shower/Locker room exhaust ductwork shall be aluminum construction conforming to ASTM B 209 Alloy 3003, Temper H14. Gauges shall be per the latest issue of SMACNA for listed pressure requirements. Seal all joints liquid-tight. Pitch ductwork back toward grille.
- D. Round and Oval Duct Liner:
 - 1. Shall be factory fabricated double-walled with 1" thick sound insulation and inner perforated galvanized metal liner. Construction shall comply with flame and smoke rating required by NFPA 90A. Metal liner shall be 24 gauge having perforations not exceeding 2.4mm (3/32 inch) diameter and approximately 22 percent free area. Metal liner for fittings need not be perforated. Provide liner couplings/spacer for metal liner. At the end of insulated sections, provide insulation end fittings to reduce outer shell to liner size. Provide liner spacing/concentricity leaving airway unobstructed. Refer to section 23 0713 for insulation requirements. All dimensions shown on the drawings are inside duct dimensions and do not include the dimension of the duct liner.
- E. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
- F. 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.
- G. High Pressure Flexible ducts

1. Manufacturers:
 - a. Flexmaster Model 3M.
 - b. Thermaflex, Model M-KC
 - c. Buckley, Model Type 3
 - d. Substitutions: See Section 01600 - Product Requirements.
2. Insulated, flexible high pressure ducts shall be used for connecting high velocity branch runouts to terminal units and other related equipment on the high pressure side of the system and shall have an inner core of all metal construction, consisting of a bonded 3 ply laminate, mechanically corrugated for strength and air tightness and covered with a one inch thick fiberglass blanket of one pound density, and an airtight foil fire retardant skin over the insulation.
 - a. Pressure Rating: 10 inches WG positive and 1.0 inches negative.
 - b. Maximum Velocity: 4000 fpm.
 - c. Temperature Range: -20 degrees F to 210 degrees F.
- H. 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.
 - a. All sealers and sealants shall meet the low VOC requirements for LEED. Refer to Division 01 of the specifications for additional information.
- I. Hanger Rod: ASTM A 36/A 36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- J. A maximum length of 12" of flexible ductwork will be allowed in the exhaust and return air ductwork systems. Contractor shall ensure that flexible ductwork used in these systems are sealed air tight to the sheet metal duct.

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. Provide air foil turning vanes of perforated metal with glass fiber insulation in all rectangular elbows in the supply air stream, return air stream, and exhaust air stream for all duct sizes with a width greater than 12" and a height greater than 12" (12"x12").
- E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- F. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
- G. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- H. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
- I. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct. Bottom of ductwork shall be sloped down to louver to allow rain, snow, etc. to run out of ductwork.
- J. All sheetmetal ductwork in the student dining / stage, shop areas, and other areas with exposed ductwork shall have paint grip type construction. All ductwork to be painted shall have the

exterior wiped down after installation with proper cleaning solution to remove any oils, grease, etc. that would prohibit paint from sticking to ductwork. Painting of ductwork shall be by General Contractor.

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.
 - 2. Diameter 15 through 26 inches: Spiral Seam Gauge = 24, Longitudinal Seam Gauge = 22.
 - 3. Diameter 27 through 36 inches: Spiral Seam Gauge = 22, Longitudinal Seam Gauge = 20.
 - 4. Diameter 37 through 50 inches: Spiral Seam Gauge = 20, Longitudinal Seam Gauge = 20.
 - 5. Diameter 51 through 60 inches: Spiral Seam Gauge = 18, Longitudinal Seam Gauge = 18.
- E. Minimum flat oval duct sheet metal gauge shall be as follows:
 - 1. Major Dimension Duct Width up through 24 inches: Spiral Seam Gauge = 24, Longitudinal Seam Gauge = 20.
 - 2. Major Dimension Duct Width 25 through 36 inches: Spiral Seam Gauge = 22, Longitudinal Seam Gauge = 20.
 - 3. Major Dimension Duct Width 37 through 48 inches: Spiral Seam Gauge = 22, Longitudinal Seam Gauge = 18.
- F. 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. Duct Diameter/Major Dimension 15 through 26 inches: Spiral Seam Gauge = 22, Longitudinal Seam Gauge = 20.
 - 3. Duct Diameter/Major Dimension 27 through 36 inches: Spiral Seam Gauge = 20, Longitudinal Seam Gauge = 20.
 - 4. Duct Diameter/Major Dimension 37 through 50 inches: Spiral Seam Gauge = 20, Longitudinal Seam Gauge = 18.
 - 5. Duct Diameter/Major Dimension 51 through 60 inches: Spiral Seam Gauge = 18, Longitudinal Seam Gauge = 18.
- G. Provide with Class A seals for all duct joints.
- H. Transverse Duct Connection System: SMACNA "E" rated rigidly class connection, 45 degree and 90 degree fittings as indicated on the drawings, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips. Special fittings as required and where not of standard construction shall be factory fabricated to fit the ductwork furnished on the Project.

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 Grippler 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. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- G. Use crimp joints with bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- H. Use double nuts and lock washers on threaded rod supports.
- I. Connect terminal units to supply ducts directly or with one foot maximum length of flexible duct. Do not use flexible duct to change direction.
- J. Connect diffusers to low pressure ducts with 10 feet maximum length of flexible duct held in place with strap or clamp.
- K. Connect flexible ducts to metal ducts with adhesive tape and draw bands.
- L. Set plenum doors 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.
- M. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- N. 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.
- O. 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.

1. Space sufficiently distant from other Work and from adjacent lines, ducts, etc., to permit maintenance, replacement, insulation, etc., so not less than 1 inch space will exist between completed finished surfaces.
 2. Space parallel runs of ductwork so that each individual run of duct can be separately insulated. Parallel runs of duct or piping, insulated as a bundle, will not be accepted.
 3. This Contractor shall clean the interior of ductwork and fittings, leaving area clean and free of loose insulation and other construction debris.
 4. Provide flexible connections at all fan powered equipment on inlet and discharge sides of equipment.
- P. 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.
- Q. 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.
- R. Seal ductwork connections to exterior wall louvers using waterproof silicone or polyurethane sealant.
1. Bottom of ductwork shall be sloped up minimum of 30 degrees toward inside of building to control entry of water.
- S. All supply make-up air ductwork connected to roof mounted supply air make-up fan and kitchen range hood shall be sealed at all joints with silicone sealer. Duct shall be wrapped with insulation.
- T. Clean interior of ductwork, leaving it free of loose material and construction debris.
- U. Where water piping is installed over electrical switchgear, provide .015, #302, 18-8 stainless steel or 20 oz. copper pans with soldered joints and approved drains to suitably protect switchgear.
- V. Sheet metal elbows and fittings shall be constructed to comply with the following:
1. Curved elbows shall have a radius not less than 150 percent of duct width to the centerline of the duct ($R/D = 1.5$).
 2. Where R/D ratio is less than 1.5, use hollow vane (air foil) vanes or turn blades.
 3. Elbows and other fittings shall be constructed the same as required for straight runs of ductwork. Round elbows shall be crimped and beaded on the downstream end. Square elbows must have turning vanes.
 4. When air foil vanes are used in elbows, elbows may have square throat and heel or radius heel and radius throat.
- W. Provide, where denoted on Drawings and in square elbows of low pressure ducts, air turning vanes designed to carry the air around the 90 degree bend without eddying or pressure fluctuations in the turn. Vanes shall be formed blade type and of standard catalog product of reputable manufacturer. Manufacturer of air turns shall recommend the number and size of blades. Air turns shall be the complete unit type installed along the diagonals of each square elbow.
1. Refer to specification section 23 3300 for additional requirements.
 2. Vanes shall be constructed and installed to limit pressure loss to not more than 20 percent of the velocity pressure.
- X. 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.

- Y. Install suspension system in accordance with manufacturer's requirements. Installation instructions shall be provided with fabric duct system by unit manufacturer.
- Z. All sheetmetal ductwork in student dining / stage, shop areas, corridors, and other areas with exposed ductwork shall have paint grip type construction. All ductwork to be painted shall have the exterior wiped down after installation with proper cleaning solution to remove any oils, grease, etc. that would prohibit paint from sticking to ductwork. Painting of ductwork shall be by General Contractor. Color shall be per room finish selection schedule by architect.

3.02 TESTING AND REPAIR

- A. Ductwork shall be sealed and leak tested as required by ASHRAE Standard 90.1.
- B. Upon completion of each respective ductwork system, but prior to insulating, covering, or backfilling, each system shall be thoroughly cleaned to remove construction dirt and foreign matter.
- C. Test Ductwork as Specified Herein
 - 1. No ductwork work shall be concealed or covered until it has been inspected and approved by the project inspector, who shall be notified when the Work is ready for inspection. Work shall be completely installed and tested as required by this Contract and Ordinances of the local Municipality and shall be leaktight to the satisfaction of those making the inspection and the Architect/ Engineer.
 - 2. In general, pressure tests shall be applied to ductwork. In no case shall piping be subject to pressure exceeding its rating. Defective work shall be promptly repaired or replaced and test shall be repeated until the particular system and component parts thereof receive approval of the Architect/Engineer.
 - 3. Provide temporary equipment for testing, including blower and gauges. Test ductwork system before insulation is installed and remove control devices before testing. Test each natural section of each ductwork system independently, but do not use ductwork dampers to isolate sections where test pressure exceeds damper pressure rating.
 - 4. Repair ductwork system sections which fail required ductwork test by disassembly and reinstallation, using new materials to extent required to overcome leakage. Do not use chemicals, stopleak compounds, mastics, or other temporary repair methods.
 - 5. Pressure for Testing of Ductwork Systems shall be as follows:
 - a. High and Medium Pressure Ductwork (above 2 inch static pressure w.g.)
 - 1) Ductwork Systems include: VAV systems upstream of terminal boxes.
 - 2) Ductwork systems shall be sealed to SMACNA Seal Class B.
 - 3) Ductwork systems shall be tested for leakage in accordance with SMACNA leakage class 12 for rectangular ductwork and leakage class 6 for round ductwork.
 - 4) Leakage test procedures shall follow the outlines and classifications in the SMACNA HVAC Duct Leakage Test Manual.
 - 5) If the tested ductwork fails to meet allotted leakage level, the contractor shall modify to bring it into compliance and shall retest it until acceptable leakage is demonstrated.
 - 6) Testing apparatus shall be a high pressure air source consisting of a portable rotary blower having an inlet damper, and flow measuring device consisting of straightening vanes and an orifice plate installed in a straight tube having properly located pressure taps. Pressure and assembly shall have its own calibrated capacity curve. Pressure and flow reading shall be taken by using "U-tube" manometers.
 - b. Low Pressure Ductwork (2 inch static pressure and below w.g.)
 - 1) Ductwork Systems include: Constant Volume Systems, Ductwork downstream of terminal air devices, exhaust ducts.
 - 2) Ductwork systems shall be sealed to SMACNA Seal Class C.

- 3) Ductwork systems shall be tested for leakage in accordance with SMACNA leakage class 24 for rectangular ductwork and leakage class 12 for round ductwork.
 - 4) Leakage test procedures shall follow the outlines and classifications in the SMACNA HVAC Duct Leakage Test Manual.
 - 5) If the tested ductwork fails to meet allotted leakage level, the contractor shall modify to bring it into compliance and shall retest it until acceptable leakage is demonstrated.
 - 6) Testing apparatus shall be a high pressure air source consisting of a portable rotary blower having an inlet damper, and flow measuring device consisting of straightening vanes and an orifice plate installed in a straight tube having properly located pressure taps. Pressure and assembly shall have its own calibrated capacity curve. Pressure and flow reading shall be taken by using "U-tube" manometers.
6. Accurately record and report methods of testing, times, and dates of test, witnesses to the test, and the results of the test. Test reports shall be neatly typewritten on standard 8-1/2 inch by 11 inch sheets and submitted in 5 copies to Architect/Engineer for approval within 5 days after test has been performed.
- D. Damage resulting from tests shall be repaired or damaged materials replaced, to satisfaction of Architect/Engineer, and at no cost to Owner.

3.03 CLEANING

- A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.
- B. Temporary Closure: At ends of ducts which are not connected to equipment or distribution devices at time of ductwork installation, cover with polyethylene film or other covering which will keep the system clean until installation is completed.
- C. Fabric Duct Cleaning and Protection:
 1. Clean air handling unit and ductwork prior to the DuctSox system unit-by-unit as it is installed. Clean external surfaces of foreign substance which may cause corrosive deterioration of facing.
 2. Temporary Closure: At ends of ducts which are not connected to equipment or distribution devices at time of ductwork installation, cover with polyethylene film or other covering which will keep the system clean until installation is completed.
 3. If fabric duct systems become soiled during installation, they should be removed and cleaned following the manufacturers standard terms of laundry.

3.04 SCHEDULES

- A. Ductwork Material:
 1. Low Pressure Supply (Heating Systems): Galvanized Steel.
 2. Low Pressure Supply (Cooling System): Galvanized Steel.
 3. Return and Relief: Galvanized Steel.
 4. General Exhaust: Galvanized Steel.
 5. Shower/Locker room: Aluminum
 6. Outside Air Intake: Galvanized Steel.

END OF SECTION

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**SECTION 23 33 00
AIR DUCT ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air turning devices
- B. Backdraft dampers.
- C. Combination fire and smoke dampers.
- D. Duct access doors.
- E. Duct test holes.
- F. Flexible duct connections.
- G. Volume control dampers.
- H. Motorized Backdraft / Relief Damper

1.02 RELATED REQUIREMENTS

- A. Refer to Section 01 6000 - Product Requirements
- B. Section 01 3516.01 - Material Documentation Sheet
- C. Section 01 5721 - IAQ Construction and Preoccupancy
- D. Section 01 5721.01 - IAQ Planning Checklist
- E. Section 01 5721.02 - IAQ Insepection Checklist
- F. Section 01 5721.03 - IAQ Log
- G. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- H. Section 01 6116.01 - Accessory Material VOC Content Certification Form.
- I. Section 23 05 48 - Vibration and Seismic Controls.
- J. Section 23 31 00 - HVAC Ducts and Casings.
- K. Section 23 36 00 - VARIABLE AIR TERMINAL UNITS: Pressure regulating damper assemblies.
- L. Section 26 05 83 - EQUIPMENT WIRING: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- B. NFPA 92 - Standard for Smoke Control Systems 2021.
- C. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations 2021.
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- E. UL 33 - Safety Heat Responsive Links for Fire-Protection Service Current Edition, Including All Revisions.
- F. UL 555 - Standard for Fire Dampers Current Edition, Including All Revisions.
- G. UL 555S - Standard for Smoke Dampers Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.

D. Manufacturer's Installation Instructions: Provide instructions for fire dampers.

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. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.
- B. All ductwork accessories kept on site shall be wrapped and protected from dirt. All ductwork and duct accessories shall be kept off floor.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

- A. Air turning vanes/extractors shall be installer fabricated or manufactured.
- B. Air turning vanes/extractors shall be provided where denoted on drawing and in all square elbows of low pressure supply, return, and exhaust ducts for sizes above 12"x12". Air turning vanes/extractors shall be designed to carry the air around the 90 degree bend without eddying or pressure fluctuation in the turn. Vanes shall be formed blade type and of standard catalog product of a reputable manufacturer. Manufacturer of air turns and extractors shall recommend the number and size of vanes. Air turning vanes shall be the complete unit type installed along the diagonals of each square elbow.
- C. Vanes shall be constructed and installed to limit pressure loss to not more than 20 percent of velocity pressure.

2.02 BACKDRAFT DAMPERS

- A. Manufacturers:
 - 1. Louvers & Dampers, Inc
 - 2. Nailor Industries Inc
 - 3. Ruskin Company
 - 4. Greenheck.
 - 5. Vent Products.
 - 6. Air Balance, Inc.
 - 7. United Enertech
 - 8. Loren Cook Company
 - 9. Pottorff
 - 10. Substitutions: See Section 01 6000 - Product Requirements.
- B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel or Extruded aluminum, with blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.
 - 1. Provide counterbalance for building pressure activation.

2.03 COMBINATION FIRE AND SMOKE DAMPERS

- A. Manufacturers:
 - 1. Louvers & Dampers, Inc
 - 2. Nailor Industries Inc
 - 3. Ruskin Company
 - 4. Ruskin.
 - 5. Greenheck
 - 6. Air Balance, Inc.

7. Vent Products
8. United Enertech
9. Pottorff
10. Substitutions: See Section 01 60 00 - Product Requirements.

- B. Fabricate in accordance with NFPA 90A, UL 555, UL 555S, and as indicated.
- C. Provide factory sleeve and collar for each damper.
- D. Multiple Blade Dampers: Fabricate with 16 gage, 0.0598 inch galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.
- E. Operators: UL listed and labelled spring return electric type suitable for 120 volts, single phase, 60 Hz. Provide end switches to indicate damper position. Locate damper operator on interior of duct and link to damper operating shaft.
- F. Normally Open Smoke Responsive Fire Dampers: Curtain type, closing upon actuation of electro thermal link, flexible stainless steel blade edge seals to provide constant sealing pressure, stainless steel springs with locking devices to ensure positive closure for units mounted horizontally.
- G. Electro Thermal Link: Fusible link melting at 165 degrees F; 120 volts, single phase, 60 Hz; UL listed and labeled.

2.04 DUCT ACCESS DOORS

- A. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
 1. Less Than 12 inches Square: Secure with sash locks.
 2. Up to 18 inches Square: Provide two hinges and two sash locks.
 3. Up to 24 by 48 inches: Three hinges and two compression latches with outside and inside handles.
- B. Access doors with sheet metal screw fasteners are not acceptable.

2.05 FIRE DAMPERS

- A. Manufacturers:
 1. Louvers & Dampers, Inc
 2. Nailor Industries Inc
 3. Ruskin Company
 4. Greenheck
 5. Air Balance, Inc.
 6. Vent Products
 7. United Enertech
 8. Pottorff
 9. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- C. Ceiling (Radiation) Dampers: Galvanized steel, 22 gage, 0.0299 inch frame and 16 gage, 0.0598 inch flap, two layers 0.125 inch ceramic fiber on top side and one layer on bottom side for round flaps, with locking clip.
 1. Manufacturers:
 - a. Ruskin Company.
 - b. Pottorff.
- D. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream

(Type B) except for 1.0 inch pressure class ducts up to 12 inches in height.

- E. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

2.06 VOLUME CONTROL DAMPERS

A. Manufacturers:

1. Louvers & Dampers, Inc
2. Nailor Industries Inc
3. Ruskin Company
4. Greenheck
5. Air Balance, Inc.
6. Vent Products
7. United Enertech
8. Pottorff.
9. Substitutions: See Section 01 60 00 - Product Requirements.

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Rectangular

1. Dampers shall be of opposed blade construction.
2. Frame shall be 5 inches by 1 inch by 16 gauge galvanized steel.
3. Blades shall be 6 inches wide by 16 gauge galvanized steel.
4. Linkage shall include a locking device to hold damper in a fixed position.

D. Round

1. Dampers shall be of the butterfly type consisting of a circular blade mounted to the shaft.
2. Frames shall be 20 gauge galvanized steel up to 20 inches diameter, 7 inches long.
3. Blades shall be 20 gauge galvanized steel.
4. Control shaft/hand quadrant shall be located on a square shaft and shall be lockable.
5. Bearings shall be molded synthetic or bronze.
6. Provide a minimum 1 1/2" shaft extension on manual dampers located in supply ductwork, to accommodate exterior ductwork insulation, to allow manual damper handle to be clear of supply ductwork.

2.07 MOTORIZED BACKDRAFT/RELIEF DAMPERS

A. Manufacturers:

1. Louvers & Dampers, Inc
2. Nailor Industries, inc
3. Ruskin Company
4. Greenheck
5. Air Balance, Inc
6. Vent Products
7. United Enertech
8. Pottorff
9. Substitutions: See Section 01 6000 - Product Requirements

B. Fabricate in accordance with SMACNA HVAC duct construction standards - Metal and flexible, as indicated.

C. Dampers, unless otherwise specified, shall be low leakage dampers and shall be designed for tight shut-off such that for a 1500 fpm damper leakage does not exceed 1 percent at 6 inches w.g. Silent closing replacable butyl and neoprene seals shall be provided on blades on all four sides of the frame. Louver linkage to be concealed in frame channel outside of the air stream. Bearings shall be nylon bushings or impregnated sintered iron. Rigid blades shall be constructed of not lighter than double 22 gauge and shall have 6 inches maximum blade width. Frames shall have welded corners and shall be diagonally braced.

- D. Whenever possible, damper size shall match ductwork size. The contractor shall verify air velocity and notify the engineer of sizing concerns prior to installation of dampers.

2.08 DAMPER ACTUATORS

- A. Damper actuators shall be provided by temperature control contractor and installed by Division 23 HVAC contractor. Refer to specification section 23 0913.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide for cleaning kitchen exhaust ducts in accordance with NFPA 96 Provide minimum 8 by 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 by 4 inch for balancing dampers only. Review locations prior to fabrication.
- D. Provide fire dampers and combination fire and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- E. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.
- F. Demonstrate re-setting of fire dampers to Owner's representative.
- G. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- H. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- I. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- J. Provide balancing dampers on high velocity systems where indicated. Refer to Section 23 36 00 - Air Terminal Units.
- K. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.
- L. Air turning vanes shall be provided where denoted on drawings and in square elbows of low pressure ducts.

END OF SECTION

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**SECTION 23 34 23
HVAC EXHAUST FANS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof exhausters.

1.02 RELATED REQUIREMENTS

- A. Refer to Section 01 6000 - Product Requirements
- B. Section 23 0548 - Vibration and Seismic Controls.
- C. Section 23 33 00 - Air Duct Accessories: Backdraft dampers.

1.03 REFERENCE STANDARDS

- A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program 2015.
- B. AMCA 99 - Standards Handbook 2016.
- C. AMCA 204 - Balance Quality and Vibration Levels for Fans 2020.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating 2016.
- E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans 2014.
- F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data 2014.
- G. NEMA MG 1 - Motors and Generators 2021.
- H. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations 2021.
- I. UL 705 - Power Ventilators Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- C. Manufacturer's Instructions: Indicate installation instructions.
- D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 FIELD CONDITIONS

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Greenheck:
- B. Loren Cook Company:
- C. Twin City Fan Co.
- D. PennBarry:

E. Acme Engineering and Manufacturing Corp.

2.02 POWER VENTILATORS - GENERAL

- A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
- B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.
- D. Fabrication: Comply with AMCA 99.
- E. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 3 EXECUTION

3.01 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 exhauster fans and as indicated.

END OF SECTION

**SECTION 23 37 00
AIR OUTLETS AND INLETS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Diffusers.
- B. Registers/grilles.

1.02 RELATED REQUIREMENTS

- A. Refer to Section 01 6000 - Product Requirements
- B. Section 01 3516.01 - Material Documentation Sheet
- C. Section 01 5721 - IAQ Construction and Preoccupancy
- D. Section 01 5721.01 - IAQ Planning Checklist
- E. Section 01 5721.02 - IAQ Insepction Checklist
- F. Section 01 5721.03 - IAQ Log
- G. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- H. Section 01 6116.01 - Accessory Material VOC Content Certification Form.
- I. Section 23 3100 - HVAC Ducts and Casings.
- J. Section 09 91 23 - Interior Painting: Painting of ducts visible behind outlets and inlets.

1.03 REFERENCE STANDARDS

- A. ADC 1062: GRD - Test Code for Grilles, Registers & Diffusers; Air Diffusion Council; 1984.
- B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating 2012 (Reapproved 2015).
- C. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets 2006 (Reaffirmed 2021).
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
- C. Project Record Documents: Record actual locations of air outlets and inlets.

1.05 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Krueger-HVAC; [____]: www.krueger-hvac.com/#sle.
- B. Price Industries; [____]: www.price-hvac.com/#sle.
- C. Titus, a brand of Air Distribution Technologies; [____]: www.titus-hvac.com/#sle.
- D. [_____].
- E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 CEILING SUPPLY: TYPE CD

- A. Fabrication: Heavy gauge aluminum extrusions with factory off-white enamel finish. Inner core assembly consisting of fixed deflection louvers available in one, two, three, and four-way flow patterns. Refer to drawings for flow patterns required.
- B. Core sizes as indicated on the drawings. Core sizes shall be 18"x18" unless otherwise noted.
- C. Core shall be easily removable from face of diffuser.
- D. Square inlet with round transition piece for connection to round duct.
- E. Outer frame shall be 22"x22" square for installation in 2' square ceiling grid.
- F. Design based on Titus: model TDC-AA, Krueger: Model 5SH, Price: Model AMD, Tuttle & Bailey: Model AM.

2.03 EXHAUST, RETURN AND AIR TRANSFER: TYPE EG, RG, AT

- A. Fabrication: Aluminum with 20-gauge minimum frames and 22 gauge minimum blades.
- B. 35 degree louvers spaced 1/2 inch on center.
- C. One set of fixed louvers parallel to long dimension.
- D. Baked white enamel or powder paint white finish for ceiling installation and prime coat for side wall installation for final painting in field to match walls.
- E. Frame: 1-1/4 inch margin with countersunk screw mounting for wall mounted and drywall ceiling installation.
- F. Frame: 1-1/4 inch margin for lay-in ceiling application.
- G. Design based on Titus, model 355FL, Krueger: Model S585, Price: Model 635, Tuttle & Bailey: Model A70D5.

2.04 WALL SUPPLY REGISTERS/GRILLES: TYPE SD

- A. Type: Streamlined and individually adjustable blades to discharge air along face of grille with two-way deflection. Front blades parallel to long dimension. Rear blades parallel to short dimension.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting and foam gasket for air tight seal.
- C. Fabrication: Aluminum extrusions with factory prime coat finish.
- D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.
- E. Baked white enamel or powder paint white finish for ceiling installation and prime coat for side wall installation for final painting in field to match wall color. Final painting by general contractor.
- F. Design based on Titus model 300FS, Krueger: Model 5885 Aluminum, Price: Model 620, Tuttle & Bailey model A64

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers. If dampers are specified and provided as part of the diffuser, or grille and register assembly balancing dampers are not required.
- E. Refer to drawings for diffuser sizes, air flow patterns, etc.

F. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 91 23.

END OF SECTION

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**SECTION 23 74 13
PACKAGED OUTDOOR CENTRAL-STATION AIR-HANDLING UNITS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Packaged roof top unit.
- B. Unit controls.
- C. Roof mounting curb and base.
- D. Maintenance service.

1.02 REFERENCE STANDARDS

- A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment 2023.
- B. AHRI 270 - Sound Performance Rating of Outdoor Unitary Equipment 2015, with Addendum (2016).
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
- C. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
- D. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.
- E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide a five year warranty to include coverage for refrigeration compressors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Carrier, a part of UTC Building and Industrial Systems, a unit of United Technologies Corp; []: www.carrier.com/#sle.

- B. Trane, a brand of Ingersoll Rand; [____]: www.trane.com/#sle.
- C. York International Corporation/Johnson Controls Inc; [____]: www.johnsoncontrols.com/#sle.
- D. Daikin.
- E. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MANUFACTURED UNITS

- A. General: Roof mounted units having gas burner and electric refrigeration.
- B. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, return fan, heat exchanger and burner, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.

2.03 BURNER

- A. Gas Burner: Atmospheric type burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shut-off pilot.
- B. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after air flow proven and slight delay, allow gas valve to open.
- C. High Limit Control: Temperature sensor with fixed stop at maximum permissible setting, de-energize burner on excessive bonnet temperature and energize burner when temperature drops to lower safe value.
- D. Supply Fan Control: Temperature sensor sensing bonnet temperatures and independent of burner controls, with provisions for continuous fan operation.

2.04 MIXED AIR CASING

- A. Dampers: Provide manual outside and return air dampers for fixed outside air quantity.
- B. Dampers: Provide remote controlled outside and return air dampers with damper operator and remote rheostat for adjusting outside air quantity.
- C. Dampers: Provide outside, return, and relief dampers with damper operator and control package to automatically vary outside air quantity. Outside air damper to fall to closed position. Relief dampers may be gravity balanced.
- D. Gaskets: Provide tight fitting dampers with edge gaskets.
- E. Gaskets: Provide tight fitting dampers with edge gaskets maximum leakage 5 percent at 2 inches pressure differential.
- F. Damper Operator: 24 volt with gear train sealed in oil.
- G. Damper Operator, Units 7.5 Ton Cooling Capacity and Larger: 24 volt with gear train sealed in oil with spring return on.
- H. Damper Operator: Pneumatic piston or gear driven type with spring return and pilot positioner.
- I. Mixed Air Controls: Maintain selected supply air temperature and return dampers to minimum position on call for heating and above 75 degrees F ambient, or when ambient air temperature exceeds return air temperature.

2.05 OPERATING CONTROLS

- A. Provide low voltage, adjustable room thermostat to control burner operation, compressor and condenser fan, and supply fan to maintain temperature setting.
 1. Include system selector switch (heat-off-cool) and fan control switch (auto-on).
 2. Provide double acting thermostat with minimum [____] stage heating and [____] stage cooling.
 3. Provide single acting thermostat with minimum [____] stage cooling.

4. Locate thermostat in room as shown.
- B. Provide remote mounted fan control switch (on-auto).
- C. Provide low limit thermostat in supply air to close outside air damper and stop supply fan.
- D. Provide night control energized by central time clock to maintain lower thermostat setting, lock out refrigeration, close outside air damper and open return air damper, stop supply air fan, for night and unoccupied operation. Provide time delay to maintain outside air damper closed and return air damper open after switching to day and occupied operation.
- E. Provide remote readout panels containing signal lights indicating system status, heating system failure, cooling system failure, and dirty filters; check switches proving signal light operations; system on-off switch, and cooling system on-off switch.
- F. Provide in panel a manual 12 hour timer to override night control, remote damper control, low limit manual reset, and remote thermostat temperature set point.

2.06 OPERATING CONTROLS - SINGLE ZONE UNITS

- A. Electric solid state microcomputer based room thermostat, located as indicated in service area with remote sensor located as indicated.
- B. Room thermostat shall incorporate:
 1. Automatic switching from heating to cooling.
 2. Preferential rate control to minimize overshoot and deviation from set point.
 3. Set-up for four separate temperatures per day.
 4. Instant override of set point for continuous or timed period from one hour to 31 days.
 5. Short cycle protection.
 6. Programming based on weekdays, Saturday and Sunday.
 7. Switch selection features including imperial or metric display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.
- C. Room thermostat display shall include:
 1. Time of day.
 2. Actual room temperature.
 3. Programmed temperature.
 4. Programmed time.
 5. Duration of timed override.
 6. Day of week.
 7. System model indication: heating, cooling, auto, off, fan auto, fan on.
 8. Stage (heating or cooling) operation.
- D. Provide low limit thermostat in supply air to close outside air dampers and stop supply fan.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Verify that proper power supply is available.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NFPA 90A.
- C. Locate remote panels where indicated on drawings.

3.03 SYSTEM STARTUP

- A. Prepare and start equipment. Adjust for proper operation.

END OF SECTION

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**SECTION 23 81 25
COMPUTER ROOM AIR CONDITIONERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air conditioning units.
- B. Controls.

1.02 RELATED REQUIREMENTS

- A. Section 01 6000 - Product Requirements
- B. Section 26 05 83 - EQUIPMENT WIRING: Electrical characteristics and wiring connections.

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers literature and data indicating water, drain, and electrical characteristics and connection requirements.
- C. Manufacturer's Field Reports: Indicate conditions at initial start-up including date, and initial set points.
- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data.
- E. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- C. Units must meet minimum efficiency requirements of ASHRAE Standard 90.1 - Energy Standard for Building Except Low-Rise Residential Buildings.

1.05 WARRANTY

- A. Provide a one year warranty to include coverage for entire unit.
- B. Provide a five year warranty to include coverage for refrigeration compressor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Liebert Corporation
- B. Stultz Air Technology Systems Inc.
- C. Skil-Aire.
- D. United Cool Air

2.02 AIR CONDITIONING UNITS

- A. Description: Split System unit with air cooled condensing unit and evaporator unit consisting of cabinet, supply fan, filters, and all necessary controls.
- B. Cabinet (Evaporator Unit): 10 gage welded steel with baked enamel finish, and lined with 1/2 inch thick acoustic duct liner.
- C. Evaporator Fan: Forward curved centrifugal, directly driven by two speed motor.
- D. Evaporator Coil: Direct expansion cooling coil of seamless copper tubes expanded into aluminum fins, with thermal expansion valve with external equalizer, liquid line filter-drier,

- service shut-off valves and charging valves. Mount coil assembly in stainless steel drain pan.
- E. Provide a 1" duct collar for supply and return air inlets. Unit to be designed for a ducted supply and return.
 - F. Filter: 1 inch thick disposable glass fiber media. Provide and install a new filter at time of substantial completion.
 - G. Cabinet (Condensor unit): 10 gage welded steel with baked enamel finish.
 - H. Compressor: Hermetic with resilient suspension system, oil strainer, internal motor overload protection, low pressure switch, manual reset high pressure switch.
 - I. Refrigerant: R410a or R407c.
 - J. Remote Air Cooled Condenser: Integral copper tube aluminum fin coil sized for rated capacity at 95 degrees F with fan driven by double shafted evaporator fan motor.
 - 1. Crankcase heater.
 - 2. Unit shall be capable of operation down to -10 degrees F.
 - K. Steam Generating Canister Type Humidifier: Self contained type with replaceable cylinder, microprocessor controlled.
 - L. Electric Reheat Coil.

2.03 CONTROL SYSTEM

- A. Unit Mounted: Main fan contactor, compressor and condenser fan contactor, compressor start capacitor, controls transformer with circuit breaker, solid state temperature and humidity control modules, humidity contactor, time delay relay, reheat contactor, and high temperature thermostat.
- B. Controls: Solid state wall mounted thermostat with start/stop switch, adjustable temperature setpoint, digital readout.
- C. Provide a set of dry contacts on the unit for the temperature control contractor. Contacts shall allow unit operation and alarms to be available to the Building Automation System.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that ceiling system is ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Coordinate installation of air conditioning unit with computer room ceiling installer and technology cable installer.
- C. Provide adequate drainage connections for water cooled units.

3.03 SYSTEM STARTUP

- A. Unit shall be have pre-start-up inspections, start up and unit commissioning completed by a factory authorized representative. Inspections, procedures, readings, set points, etc. shall be recorded in a start up report to be included in the I&O manual.
- B. Set initial temperature set points. Provide owner training to the operating personnel. Use the service and maintenance manual as a training outline. All required routine maitnenance shall be demonstrated.

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

1.03 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide typical catalog of information including arrangements.
- C. Shop Drawings:
 - 1. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
 - 2. Indicate air coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.
 - 3. Indicate mechanical and electrical service locations and requirements.
 - 4. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided.
- D. Manufacturer's Instructions: Indicate installation instructions and recommendations.
- E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 ELECTRIC CABINET UNIT HEATERS

- A. Manufacturers:
 - 1. Raywall
 - 2. Markel
 - 3. Berko
 - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Electric Heat Coils: Nichrome elements with an open wire design, UL listed and interlocked with fan motor switch so only one power connection is required. Coil should only operate when fan is running.
- C. Cabinet: 0.0598 inch steel with exposed corners and edges rounded, easily removed panels, glass fiber insulation and integral air outlet and inlet grilles.
- D. Finish: Factory applied baked enamel of color as selected by Architect/Engineer on visible surfaces of enclosure or cabinet.
- E. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.

- F. Motor: Tap wound multiple speed permanent split capacitor with sleeve bearings, resiliently mounted.
- G. Disconnect Switch: Factory mount disconnect switch.
- H. Control: Manufacturer shall provide a wall mounted thermostat that will allow the unit to operate as a stand-alone piece of equipment.
- I. Filter: Easily removed 1 inch thick glass fiber throw-away type, located to filter air before coil. Provide one set of filters to be used during the construction period. Furnish an additional set of filters to be installed in the unit at time of acceptance by the Owner.
- J. Refer to schedules and drawings for unit configuration and design capacities.
- K. Related Work by Others
 - 1. Power wiring shall be part of Division 26 Work.

END OF SECTION

Division 26

Electrical

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**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 Section 07 84 00 - Firestopping.
- D. Refer to Division 23 Mechanical Specifications and to the requirements stated therein applicable to the Electrical Work, where coordination of trades is covered.
- E. Refer to Division 28 Electronic Safety & Security Specifications and to the requirements stated therein applicable to the Electrical Work, where coordination of trades is covered & inclusion of Work provided.
- F. 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. Related Work Specified Elsewhere: Firestopping is Work of this Section though fire barrier sealants for walls and floors are specified in Section 07 84 00 - Firestopping. Contractors are also responsible for proper sizing of their sleeves and core-drilled holes so that they are at least 1-1/2 inches larger in diameter than the penetrating items. Sleeves and core-drilled holes made excessively large or made and not used, will be firestopped and charged to the Contractor who was responsible.
- E. 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.
- F. 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.

- G. 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.
- H. 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.
- I. Installation of surface mounted trough type raceway above or below switchgear, distribution panels, and/or panelboards shall be approved by engineer prior to installation.
- J. Lightning protection system shall be extended to the addition. Design and installation shall be performed by Maxwell Lighting Protection. The Electrical Contractor shall be required to provide raceways necessary for system installation and shall coordinate these requirements with lightning protection system installer.

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. Product Data: Electrical Contractor shall provide submittals for firestopping. Refer to Specification Section 07 84 00 - Firestopping.

- 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 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.

2.04 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. Panelboards, 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.

2.05 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.

2.06 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.

2.07 DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEM

- A. Provide a minimum of 8 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: fire alarm system, 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.

2.08 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.

2.09 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.
- E. The Contractor shall provide fire barrier seal around all conduit and box penetrations in fire rated wall. Refer to Specification section 07 84 00 - Firestopping for firestopping requirements.

2.10 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.

2.11 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.

2.12 MAINTENANCE AND OPERATING MANUALS AND INSTRUCTIONS

- A. Comply with Section 01 78 00 - Closeout Submittals and the following:
- B. 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 Tipp City, Building Name, 260 S Garber Drive, 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.
- C. 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.

2.13 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 03
WORK IN EXISTING BUILDINGS**

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 of Section 26 01 01 - GENERAL PROVISIONS , are included as a part of this Section as though bound herein.

1.02 SUMMARY

- A. During phasing of the Work and General Construction Schedule, all existing systems, including power, lighting, fire alarm, telephone system, public address system (intercom system), etc., shall be maintained in operation, even if it requires temporary relocation, until the new work and new system is completed and operational; at which time the old work is to be removed.
- B. This Contractor shall examine the existing site and familiarize himself with the existing conditions that will in any manner affect his work under this contract and include these conditions and required work in his bid.
- C. General - Electrical fixtures, devices, panelboards, and other items of electrical equipment located in remodeled portions of the existing building which become obsolete or are shown to be removed, shall be disconnected and removed by the Contractor. Where existing work is removed, remove associated wiring, terminations, and obsolete exposed and interfering conduit and work.
- D. Remaining lights, switches, receptacles, motors, etc., not disturbed in the remodeling shall be checked for proper operation, and circuits opened by the remodeling work shall be properly reconnected.
- E. Contractor shall be responsible for cutting and patching of existing walls, floors, and ceilings required for the installation of electrical work in the remodeled portions of the existing building. Openings shall be neatly drilled or cut.
- F. Patching shall be performed by a workman skilled in the trade involved, and patch work shall match the existing surface and finish in a manner acceptable to the Architect.
- G. Electrical work to installed in finished rooms of the existing building shall be installed in a concealed manner.
- H. Painting of patched work in the existing building will be the responsibility of this Contractor.
- I. Install necessary conduit and wiring for new luminaires, panelboards, outlets, and any other equipment, as indicated on the Drawings and as specified to be installed in the existing building.

END OF SECTION

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**SECTION 26 05 05
MINOR ELECTRICAL DEMOLITION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

1.02 RELATED REQUIREMENTS

- A. Section 01 70 00 - Execution and Closeout Requirements: Additional requirements for alterations work.
- B. Section 02 41 00 - 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 and existing record documents.
- 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 Owner at least 24 hours before partially or completely disabling system.
 - 2. Make temporary connections to maintain service in areas adjacent to work area.
- E. Existing Fire Alarm System: Maintain existing system in service throughout construction. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Notify Owner before partially or completely disabling system.
 - 2. Notify local fire service.
 - 3. Make notifications at least 24 hours in advance.
 - 4. 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. Remove any abandoned wire/cable found above ceiling that is not labeled for future use.

- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- H. Repair adjacent construction and finishes damaged during demolition and extension work.
- I. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- J. 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.
- D. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts and broken electrical parts.

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.
- B. Refer to Section 01 50 00 - Temporary Facilities and Controls for additional requirements.

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

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**SECTION 26 05 19
CONDUCTORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Metal-clad cable.
- C. Wire and cable for 600 volts and less.
- D. Wiring connectors.
- E. Electrical tape.
- F. Oxide inhibiting compound.
- G. Wire pulling lubricant.
- H. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 07 84 00 - Firestopping.
- B. Section 26 05 05 - MINOR ELECTRICAL DEMOLITION : Disconnection, removal, and/or extension of existing electrical conductors and cables.
- C. Section 26 05 26-Grounding and Bonding: Additional requirements for grounding conductors and grounding connectors.
- D. Section 26 05 53 - IDENTIFICATION: Identification products and requirements.

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. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 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. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - b. Equipment Ground, All Systems: Green.

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. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00 - Firestopping.
- O. 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.
- P. 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.

- Q. Include an equipment ground conductor with each circuit.
- R. Provide dedicated neutrals for all circuits. Do not share neutrals.
- S. Wire and cable routing indicated is approximate unless dimensioned.
- T. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.
- U. Install wire and cable in accordance with the NECA "Standard of Installation."
- V. Protect exposed cable from damage.
- W. 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.
- X. 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.

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, main switchboard, power and lighting panelboards, control centers; noncurrent carrying metal parts of fixed equipment, such as transformers, motors, starter and controller cabinets, transfer switches, generator, instrument cases, lighting fixtures, switches, receptacles, equipment in hazardous locations; and others as indicated and/or required by NEC.
- B. The grounding conductor shall be continuous wire and carried throughout the power system. Properly ground the neutral point of secondary transformers to conduit and to system ground wire. (Wire size per NEC). Grounding wire looping from transformer to transformer is not allowed.
- C. System neutral conductor shall be identified throughout and shall be grounded at the point of service only.

- D. 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.
- E. Cord connected appliance frames shall be grounded to the system grounding conductor and to the conduit system through a grounding conductor in the cord.
- F. Flexible conduit connections to equipment and motors, and the like, shall have an equipment grounding conductor, size per NEC 250.
- G. A green pigtail shall be installed from grounding slots of grounding outlets to system grounding conductor and to outlet box in each instance.
- H. A green pigtail shall be installed from the attachment bar of toggle switches to system grounding conductor and to outlet box.
- I. Green bonding jumper shall be installed in flexible metallic conduit, size per NEC 250.
- J. 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.
- K. Provide grounding of structural steel and ground field as denoted on the accompanying Drawings.
- L. 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.
- M. 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 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.
- D. MFMA-4 - Metal Framing Standards Publication 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 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

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**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 07 84 00 - Firestopping.
- B. Section 09 90 00 - Painting and Coating.
- C. Section 26 05 26 - GROUNDING AND BONDING.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- D. Section 26 05 29 - HANGERS AND SUPPORTS.
- E. Section 26 05 33.16 - BOXES.
- F. Section 26 05 53 - IDENTIFICATION.
- G. 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.

3.03 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00 - Firestopping.

END OF SECTION

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**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 07 84 00 - Firestopping.
- B. Section 26 05 29 - HANGERS AND SUPPORTS.
- C. Section 26 05 33.13 - CONDUIT:
 - 1. Conduit bodies and other fittings.
- D. Section 26 27 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. See Section 01 30 00 - Administrative Requirements.
- B. 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. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- J. Close unused box openings.

- K. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- L. Provide grounding and bonding in accordance with Section 26 05 26.
- M. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.
- N. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- O. 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.
- 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. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.
- T. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- U. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
- V. 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.
- W. Use flush mounting outlet box in finished areas.
- X. Coordinate the installation of flush mounted boxes in masonry walls with the Masonry Contractor to achieve neat openings.
- Y. Do not install flush mounting boxes back-to-back in walls; provide minimum 8 inches separation.
- Z. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- AA. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- BB. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- CC. Use adjustable steel channel fasteners for hung ceiling outlet box.
- DD. Do not fasten boxes to ceiling support wires.
- EE. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.
- FF. Use gang box where more than one device is mounted together. Do not use sectional box.
- GG. Use gang box with plaster ring for single device outlets.
- HH. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- II. 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

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**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 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.

3.02 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.

3.03 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.

3.04 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.

3.05 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. That motor overload devices are properly sized.
 - d. Test and record meter reading to ground at various points and devices.
 - e. Record nameplate data for motors, together with final voltage, running current, size of run protection fuses, and thermal overloads.
 - f. 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

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**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. Warning signs and labels.
- E. 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 2416 - Panelboards.
- F. 26 2726 - Wiring Devices.
- G. 26 2816.13 - Enclosed Circuit Breakers.
- H. 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.
- 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:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
 5. 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.
 - a. Use only for indoor locations.
 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 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.

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. Secure rigid signs using stainless steel screws.

END OF SECTION

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**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. Connections of aluminum conductors are not acceptable.
- F. 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.
- G. 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

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**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. Lighting and appliance panelboards.
- B. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- 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.

1.06 MAINTENANCE MATERIALS

- A. See Section 01 6000 - Product Requirements, for additional provisions.
- B. Furnish two of each panelboard key.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Square D
- B. Siemens.
- C. Eaton
- D. General Electric
- E. 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 POWER DISTRIBUTION PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 - 1. Phase and Neutral Bus Material: Aluminum or copper.
 - 2. Ground Bus Material: Aluminum or copper.
- D. Circuit Breakers:
 - 1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.
- E. Enclosures:
 - 1. Provide surface-mounted enclosures unless otherwise indicated.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- F. Description: NEMA PB 1, circuit breaker type.
- G. Minimum integrated short circuit rating: As indicated on the Drawings.
- H. Molded Case Circuit Breakers: With integral thermal and instantaneous magnetic trip in each pole; UL listed. For air conditioning equipment branch circuits provide circuit breakers UL listed as Type HACR.
 - 1. Coil operating voltage: 120 volts, 60 Hz.
 - 2. Coil operating voltage: 120 volts, DC.
 - 3. Size as shown on Drawings.
 - 4. Provide unit mounted control power transformer, RED indicating light in front cover.
- I. Circuit Breaker Accessories: Trip units and auxiliary switches as indicated.
- J. Cabinet Front: Surface type, fastened with concealed trim clamps, hinged door with flush lock, metal directory frame, finished in manufacturer's standard gray enamel.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 - 1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 - 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 - 2. Phase and Neutral Bus Material: Aluminum or copper.
 - 3. Ground Bus Material: Aluminum or copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
 - 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 - 2. Provide clear plastic circuit directory holder mounted on inside of door.
- F. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

- G. Provide an isolated ground bar in designated panelboards.
- H. Minimum Integrated Short Circuit Rating: As indicated on the Drawings.
- I. Molded Case Circuit Breakers: Thermal magnetic trip circuit breakers, bolt-on type, with common trip handle for all poles; UL listed.
 - 1. Type HACR for air conditioning equipment circuits.
 - 2. Class A ground fault interrupter circuit breakers where scheduled.
 - 3. Do not use tandem circuit breakers.
- J. Enclosure: NEMA PB 1, Type 1.
- K. Cabinet Box: 6 inches deep, 20 inches wide for 240 volt and less panelboards.
- L. Cabinet Front: Flush cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

2.05 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - 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 computer-generated circuit directory for each lighting and appliance panelboard and each power distribution panelboard provided with a door, clearly and specifically indicating the loads served. Revise directory to reflect circuiting changes required to balance phase loads. Identify spares and spaces.
- N. Provide identification nameplate for each panelboard in accordance with Section 26 05 53.
- O. 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

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**SECTION 26 27 26
WIRING DEVICES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Wall dimmers.
- C. Receptacles.
- D. Wall plates.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 33.16 - BOXES.
- B. Section 26 05 26 - Grounding and Bonding
- C. Section 26 05 53 - IDENTIFICATION: Identification products and requirements.
- D. Section 26 05 83 - EQUIPMENT WIRING: Cords and plugs for equipment.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2014h, with Amendments (2017).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification) 2014g, with Amendment (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices Current Edition, Including All Revisions.
- K. UL 1472 - Solid-State Dimming Controls 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.
- E. Provide GFCI protection for receptacles serving electric drinking fountains.

2.03 ALL WIRING DEVICES

- A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- B. Finishes:

2.04 WALL SWITCHES

- A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- B. Wall Switches: Heavy Duty, AC only general-use snap switch, complying with NEMA WD 6 and WD 1.
 - 1. Body and Handle: Plastic with toggle handle.
 - a. Voltage: 120 volts, AC.
 - b. Current: 20 amperes.
 - 2. Ratings: Match branch circuit and load characteristics.
- C. Switch Types: Single pole, double pole, 3-way, and 4-way.

2.05 WALL DIMMERS

- A. Wall Dimmers - Provide 0-10V dimmable wall switches as indicated on drawings.

2.06 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. Device Body: Plastic.
 - 2. Configuration: NEMA WD 6, type as specified and indicated.
 - 3. 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.
- E. Tamper Resistant Receptacles: Convenience receptacles listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.

2.07 TECHNOLOGY OUTLETS

- A. Provide rough-ins as indicated on the Drawings.

2.08 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. Cover Plates: nylon.
- C. 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. Install wall switches with OFF position down.
- M. Do not share neutral conductor on branch circuits utilizing wall dimmers.
- N. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- O. 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.
- P. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- Q. Connect wiring device grounding terminal to outlet box with bonding jumper.
- R. Install standard plates on switch, receptacle, and blank outlets in finished areas.
- S. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- T. Install protective rings on active flush cover service fittings.

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Mounting heights refer to bottom of box.
- B. Install wall switch 44 inches above finished floor.
- C. Install convenience receptacle 16 inches above finished floor, UNO.
- D. Install convenience receptacle 4 inches above backsplash of counter, UNO.
- E. Install dimmer 44 inches above finished floor.

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. Operate each wall switch and wall dimmer with circuit energized to verify proper operation.
- D. Verify that each receptacle device is energized.
- E. Test each receptacle to verify operation and proper polarity.
- F. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- G. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.06 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.

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**SECTION 26 28 16.16
ENCLOSED SWITCHES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonfusible switches.

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 0526 - Grounding and Bonding

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA (INST) - NECA Standard of Installation; National Electrical Contractors Association; 1993.
- C. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; 2002 (R2007).
- D. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum) 2013.
- E. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Submittal Procedures
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- C. Project Record Documents: Record actual locations of enclosed switches.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

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 COMPONENTS

- A. Nonfusible Switch Assemblies: NEMA KS 1, Type HD enclosed load interrupter knife switch.
 - 1. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
 - 2. Handle lockable in OFF position.
- B. Enclosures: NEMA KS 1.
 - 1. Interior Dry Locations: Type 1.
 - 2. Exterior Locations: Type 3R.

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 switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches 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. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

3.02 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, for additional requirements.
- B. Perform field inspection in accordance with Section 01 4500 and 01 4510
- C. Inspect and test in accordance with NETA ATS, except Section 4.
- D. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
- E. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

END OF SECTION

**SECTION 26 51 00
INTERIOR LIGHTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Exit signs.
- C. Accessories.

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.
- D. Section 26 27 26 - WIRING DEVICES: Manual wall switches and wall dimmers.
- E. Section 26 56 00 - EXTERIOR LIGHTING.

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 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 30 00 - 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.

2.03 LUMINAIRES

- A. Furnish products as indicated in Schedule included on the Drawings.
- B. Substitutions: See Section 01 6000 - Product Requirements.

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. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.
- G. Support luminaires larger than 2 x 4 foot size independent of ceiling framing.
- H. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- I. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- J. Grid Ceilings: Fasten luminaires to ceiling grid members using suitable clips.
- K. Install recessed luminaires to permit removal from below.
- L. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- M. Install wall mounted luminaires and exit signs at height as indicated on Drawings.

- N. Install accessories furnished with each luminaire.
- O. Connect luminaires and exit signs to branch circuit outlets provided under Section 26 0537 using flexible conduit.
- P. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- Q. Bond products and metal accessories to branch circuit equipment grounding conductor.
- R. Install specified lamps in each exit sign and luminaire.
- S. 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 in accordance with Section 01450 and 01451
- 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 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Position exit sign directional arrows as indicated.

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

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**SECTION 26 56 00
EXTERIOR LIGHTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior luminaires.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 29 - HANGERS AND SUPPORTS.
- B. 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, 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.
- I. Bond luminaires and metal accessories to branch circuit equipment grounding conductor.

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

Division 28

Electronic Safety and Security

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**SECTION 28 31 01
FIRE ALARM - DETECTION SYSTEM**

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 labor, material, equipment, and accessories necessary for a complete operable, electronically operated fire alarm system as indicated on the Drawings and specified herein.
- B. The existing fire alarm panel is Notifier - NFS 320. Initiating and notification devices shall be added to the existing system for this project as shown on the Drawings. Contractor shall be responsible for gaining full approval of system from local authorities through plan approval and project inspections.

1.03 SUBMITTALS

- A. Shop Drawings
 - 1. The system manufacturer's representative shall be responsible for furnishing 5 sets of engineering drawings matching the layout, scale, and sheet size of the contract documents. These drawings shall be assembled in a manor to satisfy the most recently adopted edition of the Ohio Building Code (OBC) concerning Fire Alarm Detection System Shop Drawings. These drawings shall indicate the interlocking of equipment external to the various control panels. These Drawings shall be included in the submittal to the Architect/Engineer for approval and shall be stamped/signed by a manufacturer's representative who is NICET Level III or IV certified and certified by the State of Ohio Board of Building Standards (OBBS) as a fire alarm system designer, or stamped by a Professional Engineer in the State of Ohio. The Owner will pay the drawing approval fees associated with the state plan approval of the fire alarm system. The Architect will be responsible for submitting the final fire alarm system shop drawings to the state for approval. The Contractor must submit this shop drawing information in a timely manner so as not to impede the project progress.
 - 2. Complete and comprehensive shop drawings shall be submitted to the Architect/Engineer for review.
- B. Post Construction
 - 1. Provide signed (by attendees & trainer) & dated training syllabus for each completed training session to the Architect/Engineer Technology Designer.
 - 2. Operation & Maintenance Manuals
 - a. Provide complete O & Ms. PDF format.
 - b. PDF shall be fully indexed by Section Name/System/Device.
 - 3. The Architect/Engineer Technology Designer may require operational demonstration of any products and systems to verify Execution/Installation/Configuration requirements are met.

1.04 QUALITY ASSURANCE

- A. Units on the fire alarm system shall be listed by Underwriters Laboratories, Inc. for fire alarm use, and the control panel shall bear the UL label. The system shall be installed in accordance with requirements set by National Electric Code with particular attention to Article 760 and in compliance with applicable provisions of Standards No. 72 published by the National Fire Protection Association (NFPA), section 907 of the Ohio Building Code (OBC) and also with Local Code requirements.

- B. All equipment must have transient protection to comply with UL864 requirements. Where fire alarm circuits leave the building, additional transient protection must be provided for each circuit.

1.05 CERTIFICATION

- A. The Contractor shall provide the services and equipment of an alarm service company certified by NICET as being capable of furnishing the signaling systems specified herein. All components of the fire alarm system shall be U.L. listed.
- B. The Contractor shall be certified by the system manufacturer for installation and programming with a minimum of five years experience with this system or similar fire alarm systems. All components of the fire alarm system shall be U.L. listed.

1.06 WARRANTY

- A. Components, parts, and assemblies supplied by the manufacturer shall be guaranteed against defects in materials and workmanship in a period of 12 months, commencing upon system start up and beneficial use, at which time the system is protecting property of occupants, provided such defects are not caused by a misuse, abuse, neglect, unauthorized tampering, equipment modifications, or acts of God. Warranty services shall be provided by a qualified factory trained representative of the equipment manufacturer during normal working hours. The representative shall be based in a fully staffed branch office and located within a reasonable distance from the job site. An adequate supply of repair parts shall be maintained by the branch office. The manufacturer shall not be liable for consequential damages. The manufacturer's statement of warranty shall be included in the submittals.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Notifier
- B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE ALARM CONTROL PANEL

- A. The existing addressable Fire Alarm Control Panel (FACP) is by Notifier - NFS 320. The system shall be modified as shown on the Drawings.

2.03 SYSTEM DEVICES

- A. Addressable Manual Fire Alarm Pull Station.
 - 1. The pull station shall be dual action pull lever type, key resettable, have a permanently attached intelligent addressable module, and have a plastic breakrod. The pull station shall have a red, metal die-cast housing.
 - 2. The pull station shall contain electronics that communicate the station's status to the FACP.
- B. Addressable Thermal Fire Detector and base.
 - 1. Combination rate-of rise and 135 degrees F fixed temperature
 - 2. White polycarbonate housing.
 - 3. Low profile, flanged, addressable mounting base with electronics to communicate the detector's status to the FACP.
 - a. Thermal fire detectors used for direct control of other systems or devices (i.e. smoke dampers, door holds, elevators, shunt trip circuit breakers, etc.) shall have a mounting base equipped with an integral set of dry contacts, or an external intelligent addressable relay module may be used for control. Power through the relay to be coordinated with Division 26. Refer to E3 and E5 sheets for additional information.
- C. Addressable Area Photo Electric Smoke Detector and base.
 - 1. Intelligent photoelectric smoke sensor with LED which flashes when detector is polled and turns steady on when detector goes into alarm.

- a. Provide a remote LED indicator for smoke detectors mounted above ceilings in smoke dampers and the like. LED indicator shall be flush mounted in ceiling directly below smoke detectors. Provide a label for the remote LED to indicate its purpose.
- 2. White polycarbonate housing.
- 3. Low profile, flanged, addressable mounting base with electronics to communicate the detector's status to the FACP.
 - a. Smoke detectors used for direct control of other systems or devices (i.e. smoke dampers, door holds, elevators, shunt trip circuit breakers, etc.) shall have a mounting base equipped with an integral set of dry contacts, or an external intelligent addressable relay module may be used for control. Power through the relay to be coordinated with Division 26. Refer to E3 and E5 sheets for additional information.
- D. Addressable Monitor Module.
 - 1. Intelligent addressable module with electronics to communicate the module's status to the FACP.
 - 2. LED to indicate module status.
- E. Addressable Relay Module.
 - 1. Intelligent addressable module with electronics to communicate the module's status to the FACP.
 - 2. LED to indicate module status.
 - 3. Two isolated sets of contacts to control desired functions.
- F. Signal Devices:
 - 1. Recessed combination synchronized strobe light with 4 inch electronic horn (or single synchronized strobe), with back box and trim, 24VDC, with light intensity of 110 candela, 225mA, flush mounted at 80 inches above finished floor or 6 inches below ceiling, whichever is lower.
 - a. Wire circuits to a maximum of 80% capacity.
 - b. Provide a sync module for signal devices.

2.04 SYSTEM WIRING

- A. Provide in accordance with manufacturer's instructions, wiring, and outlet boxes for the erection of a complete system as described herein and as shown on the Engineer's Drawings. Minimum wire size shall be No. 14, provide wiring per manufacturer's requirements.
- B. Wiring shall be in accordance with requirements of the National Electrical Code and NFPA Regulation No. 72. The fire alarm, including components and wiring, shall be completely installed and wiring shall be properly tagged and color coded. The Contractor shall make final connections as shown and required by the equipment manufacturer's wiring instructions.
- C. The manufacturer's authorized representative shall perform a quality inspection of the final installation, which shall be done in the presence of the Contractor and local Authority Having Jurisdiction (AHJ). The representative shall submit a certificate of completion to the contractor when work is satisfactorily completed.

2.05 SYSTEM PERFORMANCE REQUIREMENTS

- A. The activation of any fire alarm station or automatic detector circuit shall automatically perform the following functions:
 - 1. All automatic programs assigned to the alarm point shall be executed and the associated indicating devices and relays activated.
 - 2. The System Alarm on appropriate panel will indicate an alert condition.
 - 3. Activate all control by event functions related to the alarm.
 - 4. The approved certified Central Monitoring Agency to be signaled automatically.
 - 5. Sound a continuous alarm over all signals and activate the associated flashing light.
 - 6. Activation of the building fire alarm system shall automatically unlock access controlled egress doors and the doors shall remain unlocked until the fire alarm system has been

reset.

B. Test - Fire Drill Mode

1. Include with the system a "Fire Drill Mode". Upon activation of Fire Drill Mode, the annunciators and horns and strobes will activate. HVAC units will NOT be shut down, and the communicator will NOT dial out to the central monitoring agency. This will be a button activation at the main control panel, and there will be button deactivation at the main control panel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install new manual stations, signals, wiring system, and power and automatic stations (ceiling smoke detectors, duct mounted smoke detectors, thermo detectors, and the like). Connect to existing fire alarm system as required by system manufacturer.
- B. Installations shall be in strict conformance with the manufacturer's recommendations.
- C. Outlets shall be equipped with the appropriate fire alarm device.
- D. Wiring shall be installed in conduit.

3.02 PROGRAMMING

- A. Program the system using the Owner's final room number designations, not the Architect's room numbers as shown on the Drawings.

3.03 PARTIAL OR CONTINUED OCCUPANCY

- A. Should the Owner elect to partially occupy or continuously occupy the building prior to Substantial Completion of all work, the fire alarm system for that portion of the building so occupied, including the assigned means of egress from same, shall be made fully operational. System status shall be certified in writing by the manufacturer and the Division 26 Contractor.

3.04 DEMONSTRATION/INSPECTION

- A. The manufacturer's authorized representative shall perform a quality inspection of the final installation and in the presence of electrical contractor and Owner's representatives, shall perform a complete functional testing of this system. A system certification verifying the proper system operation shall be required prior to acceptance by the Owner.
- B. Demonstrate entire system and proper function of each device.
- C. Coordinate and assist the Owner with the requirements and set-up of system monitoring with the monitoring company of the Owner's preference.

END OF SECTION

Division 31

Earthwork

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**SECTION 31 10 00
SITE CLEARING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Clearing of existing vegetation.
- B. 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 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- C. Section 31 22 00 - Grading: Topsoil removal.
- D. Section 31 23 23 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

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 Owner. 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.

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.

1.03 PROJECT CONDITIONS

- A. Protect above- and below-grade utilities that remain.
- B. 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.

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. Have stockpile areas approved by owners representative.
 - 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. Shrub Beds: 18 inches.
- F. Place topsoil during dry weather.
- G. Remove roots, weeds, rocks, and foreign material while spreading.
- H. Near 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.

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

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**SECTION 31 23 16
EXCAVATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavating for footings, slabs-on-grade, paving, and dewatering.
- B. 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 bench marks, survey control points, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2 EXECUTION

2.01 EXAMINATION

- A. Verify that survey bench mark and intended elevations for the work are as indicated.

2.02 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 owners representative.

2.03 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.

2.04 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. 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.

2.05 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 owners representative before placement of foundations.

2.06 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

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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, and paving.
- 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 approved by owners representative.
 - 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. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

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Division 32

Exterior Improvements

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**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 12 16 - Asphalt Paving: Finish and binder asphalt courses.
- D. 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.

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 Bituminous Concrete Paving:
 1. Place course aggregate to a compacted thickness as scheduled.
 - a. 8 inches minimum thickness for:
 - 1) Standard Duty Paving
 - b. 8 inches minimum thickness if not called out otherwise
 2. Compact to 95 percent of maximum dry density.
- B. 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.
- C. Place aggregate in maximum 6 inch layers and roller compact to specified density.
- D. Level and contour surfaces to elevations and gradients indicated.
- E. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.
- F. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- G. 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

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**SECTION 32 12 16
ASPHALT PAVING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single course bituminous concrete paving.

1.02 RELATED REQUIREMENTS

- A. Section 31 22 00 - Grading: Preparation of site for paving and base.
- B. Section 31 23 23 - Fill: Compacted subgrade for paving.
- C. Section 32 11 23 - AGGREGATE BASE AND SURFACING: Aggregate base course.

1.03 REFERENCE STANDARDS

- A. Ohio Department of Transportation, Construction and Material Specifications

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with Ohio Department of Transportation (ODOT) Construction and Material Specifications.
- B. Mixing Plant: Complying with State of Ohio Highways standard.
- C. Obtain materials from same source throughout.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for paving work on public property.

1.06 FIELD CONDITIONS

- A. Do not apply asphalt materials if subgrade is wet or excessively damp.
- B. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aggregate for Intermediate Course: Ohio Department of Transportation (ODOT) Construction and Material Specifications Item 441 Type 2
 - 1. Use of ODOT certified Reclaimed Pavement:
 - a. Contractor may use a blend of new material in combination with reclaimed asphalt concrete pavement or reclaimed bituminous aggregate base pavement obtained from the job site.
 - b. A maximum of 25 percent of reclaimed pavement may be used without adjusting the Job Mix Formula.
- B. Aggregate for Surface Course: Ohio Department of Transportation (ODOT) Construction and Material Specifications Item 441 Type 1.
 - 1. Use of ODOT certified Reclaimed Pavement:
 - a. Contractor may use a blend of new material in combination with reclaimed asphalt concrete pavement or reclaimed bituminous aggregate base pavement obtained from the job site.
 - b. A maximum of 25 percent of reclaimed pavement may be used without adjusting the Job Mix Formula.
- C. Fine Aggregate: Ohio Department of Transportation (ODOT) Construction and Material Specifications.
- D. Mineral Filler: Finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter.
- E. Tack Coat: Homogeneous, medium curing, liquid asphalt.

1. Homogeneous, medium curing, liquid asphalt, complying with the ASTM D 977 or ASTM 2397
 2. ODOT Item 408 bituminous prime coat at 0.04 gallon per square yard.
- F. Seal Coat:
1. Coal tar emulsion with sand additive for the seal coat and apply two coats.

2.02 ASPHALT PAVING MIXES AND MIX DESIGN

- A. Use dry material to avoid foaming. Mix uniformly.

PART 3 EXECUTION

3.01 GENERAL

- A. Perform work in accordance to Ohio Department of Transportation (ODOT) Construction and Material Specifications.

3.02 EXAMINATION

- A. Verify that compacted subgrade and granular base is dry and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.
- C. Proof roll prepared granular base to check for unstable areas and areas requiring additional compaction.
1. Notify the Owners Representative prior to start of work of unacceptable base conditions.
 2. Notify the Construction Manager prior to start of work of unacceptable base conditions.
 3. Start of work indicates acceptance of base.

3.03 PATCHING

- A. Saw cut perimeter of patch and excavate existing pavement section to sound base.
- B. Excavate rectangular or trapezoidal patches extending 12 inches into adjacent sound pavement, unless otherwise indicated.
- C. Cut excavation faces vertically.
- D. Remove excavated material.
- E. Recompact existing unbounded-aggregate base course to form new subgrade.

3.04 PREPARATION - TACK COAT

- A. Apply tack coat in accordance with manufacturer's instructions.
- B. Apply tack coat to contact surfaces of curbs, gutters and other surfaces.
- C. Coat surfaces of manhole frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.05 PLACING ASPHALT PAVEMENT - SINGLE COURSE

- A. All areas in which paving fabric has been placed shall be paved during the same day.
- B. Install Work in accordance with Ohio Department of Transportation (ODOT) Construction and Material Specifications.
- C. Place asphalt within 24 hours of applying primer or tack coat.
- D. Compact pavement in accordance with Ohio Department of Transportation (ODOT) Construction and Material Specifications. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.
- E. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.06 TOLERANCES

- A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

1. Pavement sections which puddle water (birdbath) will not be acceptable. These sections will be removed and replaced and the entire area will be sealed to conceal patch.
- B. Variation from true Elevation: Within 1/4 inch.
- C. Compacted Thickness: Per table X1.1 in ASTM D3549-03, based on per layer compacted thickness.

3.07 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, for general requirements for quality control.
- B. Provide field inspection and testing. Take samples and perform tests in accordance with the following.
 1. Thickness: In place compacted thickness of hot-mix asphalt course to be determined according to ASTM D 3549.
 2. Surface Smoothness: Finished surface of each hot mix asphalt course will be tested for compliance with smoothness tolerances.
 3. In-place Density:
 - a. The right is reserved by the Owner/Architect to invoke the following material testing procedure when he deems necessary during and after pavement installation.
 - b. Testing agency to take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.
 - 1) Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepare according to ASTM D 2041, and compact according to job-mix specifications.
 - 2) In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - (a) One core sample will be taken for every 1000 square feet or less of installed pavement with no fewer than 3 cores taken.
 - (b) Field density of in place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlates with ASTM D 1188 or ASTM D 1726.
- C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.08 PROTECTION

- A. Immediately after placement, protect pavement from mechanical injury for 5 days or until surface temperature is less than 140 degrees F.
- B. Remove debris, junk, and trash from site.

3.09 SCHEDULE

- A. Standard Duty Paving:
 1. Aggregate specified in Section 32 1123
 2. Intermediate Course: 2 1/2 inch average compacted thickness placed upon prime coat.
 3. Tack Coat: # 407 ODOT. Apply at the rate of 0.4 gallons per square yard.
 4. Surface Course: 1 1/2 inch average compacted thickness placed upon properly compacted Intermediate Course.

END OF SECTION

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**SECTION 32 13 13
CONCRETE PAVING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete paving, sidewalks.

1.02 RELATED REQUIREMENTS

- A. Section 31 2200 - Grading.
- B. 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: 4,000 psi 28 day concrete, 4 inches thick. light broom finish.

2.02 FORM MATERIALS

- A. 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: Not 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 Owners Representative.

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 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, and formed joints 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.

3.06 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.

3.07 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.

3.08 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
- B. Maximum Variation From True Position: 1/4 inch.

3.09 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.

3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Owners Representative 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 Owners Representative. 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 Owners Representative for each individual area.

3.11 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian or vehicular traffic over pavement until 75 percent design strength of concrete has been achieved.

END OF SECTION