PROJECT MANUAL

FOR THE CONSTRUCTION OF THE

# Collins P. Lee Memorial Library

**237 HARRISBURG RD. SW,**
**MILLEDGEVILLE, GA 31061**

**ISSUED FOR BID AND PERMIT**
**MARCH 20, 2026**

OWNER
**MIDDLE GEORGIA REGIONAL LIBRARY SYSTEM**
**1180 WASHINGTON AVENUE**
**MACON, GA, 31201**

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CAS ARCHITECTURE, P.C.
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END OF SECTION 000110

# SECTION 000115 - LIST OF DRAWING SHEETS

## 1.1 LIST OF DRAWINGS

A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the **Drawing Index page G110** of the separately bound drawing set titled **COLLINS P. LEE MEMORIAL LIBRARY – 237 Harrisburg RD. SW, Milledgeville, GA 31061**, dated **2026/03/20**, as modified by subsequent Addenda and Contract modifications.

END OF DOCUMENT 000115

# SECTION 002113 - INSTRUCTIONS TO BIDDERS

## 1.1 INSTRUCTIONS TO BIDDERS

A. AIA Document A701, "Instructions to Bidders," is hereby incorporated into the Procurement and Contracting Requirements.

1. A copy of AIA Document A701, "Instructions to Bidders," is bound in this Project Manual.

END OF DOCUMENT 002113

# AIA® Document A701™ – 1997

## *Instructions to Bidders*

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

**THE OWNER:**
*(Name, legal status and address)*
OWNER NAME
OWNER ADDRESS

**THE ARCHITECT:**
*(Name, legal status and address)*
CAS Architecture, P.C.
1485 Natchez Way
Grayson, GA 30017-2930
Telephone: 678-646-7736 E-mail: csmith@casarc.com

**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.

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

**§ 1.2** Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

**§ 1.3** Addenda are written or graphic instruments issued by the Architect prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.

**§ 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 as the base, to which Work may be added or from which Work may be deleted for 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 the amount of 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** The Bidder by making a Bid represents that:

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

**§ 2.1.2** The Bid is made in compliance with the Bidding Documents.

**§ 2.1.3** The Bidder has visited the site, become familiar with local conditions under which the Work is to be performed and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents.

**§ 2.1.4** The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception.

## ARTICLE 3 BIDDING DOCUMENTS

### § 3.1 COPIES

**§ 3.1.1** Bidders may obtain complete sets of the Bidding Documents from the issuing office designated in the Advertisement or Invitation to Bid in the number and for the deposit sum, if any, stated therein. The deposit will be refunded to Bidders who submit a bona fide Bid and return the Bidding Documents in good condition within ten days after receipt of Bids. The cost of replacement of missing or damaged documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the Bidding Documents and the Bidder's deposit will be refunded.

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**§ 3.1.2** 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.

**§ 3.1.3** Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

**§ 3.1.4** The Owner and Architect may make copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

**§ 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS**

**§ 3.2.1** The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall at once report to the Architect errors, inconsistencies or ambiguities discovered.

**§ 3.2.2** Bidders and Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach the Architect at least seven days prior to the date for receipt of Bids.

**§ 3.2.3** Interpretations, corrections and changes of the Bidding Documents will be made by Addendum. Interpretations, corrections and changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them.

**§ 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** No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

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

**§ 3.3.4** 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 all who are known by the issuing office to have received a complete set of Bidding Documents.

**§ 3.4.2** Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

**§ 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** Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

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## ARTICLE 4 BIDDING PROCEDURES

### § 4.1 PREPARATION OF BIDS

**§ 4.1.1** Bids shall be submitted on the forms included with the Bidding Documents.

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

**§ 4.1.3** Sums shall be expressed in both words and figures. In case of discrepancy, the amount written in words shall govern.

**§ 4.1.4** Interlineations, alterations and erasures 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."

**§ 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 make no 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 of the Bidder and the nature of legal form of the Bidder. The Bidder shall provide evidence of legal authority to perform within the jurisdiction of the Work. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give 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.

### § 4.2 BID SECURITY

**§ 4.2.1** Each Bid shall be accompanied by a bid security in the form and amount required if so stipulated in the Instructions to Bidders. The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and will, 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. The amount of the bid security shall not be forfeited to the Owner in the event the Owner fails to comply with Section 6.2.

**§ 4.2.2** If a surety bond is required, it shall be written on AIA Document A310, Bid Bond, unless otherwise provided in the Bidding Documents, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the power of attorney.

**§ 4.2.3** The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and bonds, if required, have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn or (c) all Bids have been rejected.

### § 4.3 SUBMISSION OF BIDS

**§ 4.3.1** All copies of the Bid, the bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in 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.

**§ 4.3.2** Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.

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

**§ 4.3.4** Oral, telephonic, telegraphic, facsimile or other electronically transmitted bids will not be considered.

### § 4.4 MODIFICATION OR WITHDRAWAL OF BID

**§ 4.4.1** A Bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, and each Bidder so agrees in submitting a Bid.

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**§ 4.4.2** Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder. Written confirmation over the signature of the Bidder shall be received, and date- and time-stamped by the receiving party on or before the date and time set for receipt of Bids. A change shall be so worded as not to reveal the amount of the original Bid.

**§ 4.4.3** Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.

**§ 4.4.4** Bid security, if required, shall be in an amount sufficient for the Bid as resubmitted.

## ARTICLE 5 CONSIDERATION OF BIDS

### § 5.1 OPENING OF BIDS

At the discretion of the Owner, if stipulated in the Advertisement or Invitation to Bid, the properly identified Bids received on time will be publicly opened and will be read aloud. An abstract of the Bids may be made available to Bidders.

### § 5.2 REJECTION OF BIDS

The Owner shall have the right to reject any or all Bids. A Bid not accompanied by a required bid security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.

### § 5.3 ACCEPTANCE OF BID (AWARD)

**§ 5.3.1** It is the intent of the Owner to award a Contract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's own best interests.

**§ 5.3.2** The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

## ARTICLE 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, a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted as a prerequisite to the issuance of Bidding Documents.

### § 6.2 OWNER'S FINANCIAL CAPABILITY

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

### § 6.3 SUBMITTALS

**§ 6.3.1** The Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, after notification of selection for the award of a Contract, furnish to the Owner through the Architect in writing:

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

**§ 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.

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**§ 6.3.3** Prior to the execution of the Contract, the Architect will notify the Bidder in writing if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, (1) withdraw the Bid or (2) submit an acceptable substitute person or entity with an adjustment in the Base Bid or Alternate Bid to cover the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

**§ 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. Bonds may be secured through the Bidder's usual sources.

**§ 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** If the Owner requires that bonds be secured from other than the Bidder's usual sources, changes in cost will be adjusted as provided in the Contract Documents.

### § 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 be commenced prior thereto 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. Both bonds shall be written in the amount of the Contract Sum.

**§ 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 thereto a certified and current copy of the power of attorney.

## ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment Is a Stipulated Sum.

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## *AIA® Document A701™ – 1997*

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**PAGE 1**

PROJECT NAME
PROJECT ADDRESS

...

OWNER NAME
OWNER ADDRESS

...

*(Name, legal status and address)*
CAS Architecture, P.C.
1485 Natchez Way
Grayson, GA 30017-2930
Telephone: 678-646-7736 E-mail: csmith@casarc.com

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# *Certification of Document's Authenticity*

*AIA® Document D401™ – 2003*

I, Chad A Smith, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 12:28:53 on 11/07/2016 under Order No. 6333509677_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A701™ – 1997, Instructions to Bidders, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

*(Signed)*

_____

*(Title)*

_____

*(Dated)*

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# SECTION 002213 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

## 1.1 INSTRUCTIONS TO BIDDERS

A. Instructions to Bidders for Project consist of the following:

1. AIA Document A701, "Instructions to Bidders," a copy of which is bound in this Project Manual.
2. The following Supplementary Instructions to Bidders that modify and add to the requirements of the Instructions to Bidders.

## 1.2 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS, GENERAL

A. The following supplements modify AIA Document A701, "Instructions to Bidders." Where a portion of the Instructions to Bidders is modified or deleted by these Supplementary Instructions to Bidders, unaltered portions of the Instructions to Bidders shall remain in effect.

## 1.3 ARTICLE 2 - BIDDER'S REPRESENTATIONS

A. Add Section 2.1.3.1:

1. 2.1.3.1 - The Bidder has investigated all required fees, permits, and regulatory requirements of authorities having jurisdiction and has properly included in the submitted bid the cost of such fees, permits, and requirements not otherwise indicated as provided by Owner.

B. Add Section 2.1.5:

1. 2.1.5 - The Bidder is a properly licensed Contractor according to the laws and regulations of the State of Georgia and **Baldwin County** Ordinances and meets qualifications indicated in the Procurement and Contracting Documents.

C. Add Section 2.1.6:

1. 2.1.6 - The Bidder has incorporated into the Bid adequate sums for work performed by installers whose qualifications meet those indicated in the Procurement and Contracting Documents.

## 1.4 ARTICLE 3 - BIDDING DOCUMENTS

A. 3.2 - Interpretation or Correction of Procurement and Contracting Documents:

1. Delete Section 3.2.2 and replace with the following:

a. 3.2.2.1 – Bidders and Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach the

Architect by the Questions **Deadline indicated in Section 001113 – Advertisement for Bids**.

b. 3.2.2.2 - Submit Bidder's Requests for Interpretation using form bound in the Project Manual.

B. 3.4 - Addenda:

1. Delete Section 3.4.3 and replace with the following:

a. 3.4.3 - Addenda may be issued no later than **Deadline indicated in Section 001113 – Advertisement for Bids** except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

2. Add Section 3.4.4.1:

a. 3.4.4.1 - Owner may elect to waive the requirement for acknowledging receipt of 3.4.4 Addenda as follows:

1) 3.4.4.1.1 - Information received as part of the Bid indicates that the Bid, as submitted, reflects modifications to the Procurement and Contracting Documents included in an unacknowledged Addendum.
2) 3.4.4.1.2 - Modifications to the Procurement and Contracting Documents in an unacknowledged Addendum do not, in the opinion of Owner, affect the Contract Sum or Contract Time.

1.5 ARTICLE 4 - BIDDING PROCEDURES

A. 4.1 - Preparation of Bids:

1. Add Section 4.1.1.1:

a. 4.1.1.1 - Printable electronic Bid Forms and related documents are available from Architect – CAS Architecture, P.C. upon written request.

2. Add Section 4.1.8:

a. 4.1.8 - The Bid shall include unit prices when called for by the Procurement and Contracting Documents. Owner may elect to consider unit prices in the determination of award. Unit prices will be incorporated into the Contract.

3. Add Section 4.1.9:

a. 4.1.9 - Owner may elect to disqualify a Bid due to failure to submit a Bid in the form requested, failure to Bid requested alternates or unit prices, failure to complete entries in all blanks in the Bid Form, or inclusion by the Bidder of any alternates, conditions, limitations or provisions not called for.

4. Add Section 4.1.10:

a. 4.1.10 **-** Bids shall include sales and use taxes. Contractors shall show separately with each monthly payment application the sales and use taxes paid by them and their subcontractors in the form indicated. Reimbursement of sales and use taxes, if any, shall be applied for by Owner for the sole benefit of Owner.

B. 4.3 - Submission of bids:

1. Add the following sections to 4.3.1:

a. 4.3.1.2 - Include Bidder's Contractor License Number applicable in Project jurisdiction on the face of the sealed bid envelope.
b. 4.3.1.3 - Each Bid must include a notarized affidavit providing your E-Verify registration number and a W-9. In addition to providing the required signed and notarized contractor affidavit before any Bid is considered, should the contractor use subcontractors, the contractor will secure from the subcontractor(s) attestation of each subcontractor's compliance with O.C.G.A. § 13-10-90 *et seq*. The contractor agrees to provide the Architect with all affidavits from any subcontractor engaged to perform services under any contract between the Contractor and Owner within 5 business days of the subcontractor being hired.

C. 4.4 - Modification or Withdrawal of Bids:

1. Add the following sections to 4.4.2:

a. 4.4.2.1 - Such modifications to or withdrawal of a Bid may only be made by persons authorized to act on behalf of the Bidder. Authorized persons are those so identified in the Bidder's corporate bylaws, specifically empowered by the Bidder's charter or similar legally binding document acceptable to Owner, or by a power of attorney, signed and dated, describing the scope and limitations of the power of attorney. Make such documentation available to Owner at the time of seeking modifications or withdrawal of the Bid.
b. 4.4.2.2 - Owner will consider modifications to a Bid hand written on the outside of the sealed Bid envelope by authorized persons when such modifications comply with the following: the modification is indicated by a percent or stated amount to be added to or deducted from the Bid; written in ink ; the amount of the Bid itself is not made known by the modification; a signature of the authorized person, along with the time and date of the modification, accompanies the modification. Completion of an unsealed bid form, awaiting final figures from the Bidder, does not require power of attorney due to the evidenced authorization of the Bidder implied by the circumstance of the completion and delivery of the Bid.
c. 4.4.2.3 – If the Bid is forwarded by mail, the sealed envelope containing the Bid must be enclosed in another envelope to the attention of:
**Carlos Francisco Tobar**
**County Manager,**
**1601 N. Columbia Street, Suite 230**
**Milledgeville, Georgia 31061**

d. 4.4.2.4 – All Bids must be filled out and completed on the bid Form of the type bound in the Project Manual, in accordance with Section 002113 – Instructions to Bidders. No interlineations, additions, or deletions are to be made to the Bid Form by the Bidder. No conditional Bids will be accepted.

e. 4.4.2.5 – All blank spaces for the lump sum price and alternate prices (if any) must be filled in completely, in ink or typewritten, in both words and figures. In case of discrepancies, the amount shown in words will govern. Prior to the Bid opening time, errors may be stricken or revisions may be made and corrections entered on the Bid Form, provided that any such strike-over or revision is signed in ink by the person signing the Bid of his/her Agent.

D. 4.5 - Break-Out Pricing Bid Supplement:

1. Add Section 4.5:

a. 4.5 - Provide detailed cost breakdowns no later than two business days following Architect's request.

E. 4.6 - Subcontractors, Suppliers, and Manufacturers List Bid Supplement:

1. Add Section 4.6:

a. 4.6 - Provide list of major subcontractors, suppliers, and manufacturers furnishing or installing products no later than two business days following Architect's request. Include those subcontractors, suppliers, and manufacturers providing work totaling three percent or more of the Bid amount. Do not change subcontractors, suppliers, and manufacturers from those submitted without approval of Architect.

1.6 ARTICLE 5 - CONSIDERATION OF BIDS

A. 5.2 - Rejection of Bids:

1. Add Section 5.2.1:

a. 5.2.1 - Owner reserves the right to reject a Bid based on Owner's and Architect's evaluation of qualification information submitted following opening of Bids. Owner's evaluation of the Bidder's qualifications will include: status of licensure and record of compliance with licensing requirements, record of quality of completed work, record of Project completion and ability to complete, record of financial management including financial resources available to complete Project and record of timely payment of obligations, record of Project site management including compliance with requirements of authorities having jurisdiction, record of and number of current claims and disputes and the status of their resolution, and qualifications of the bidder's proposed Project staff and proposed subcontractors.

1.7 ARTICLE 6 - POSTBID INFORMATION

A. 6.3 - Submittals:

1. Add Section 6.3.1.4:

a. 6.3.1.4 - Submit information requested in Sections 6.3.1.1, 6.3.1.2, and 6.3.1.3 no later than two business days following Architect's request.

1.8 ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

A. 7.1 - Bond Requirements:

1. Add Section 7.1.1.1:

a. 7.1.1.1 - Both a Performance Bond and a Payment Bond will be required, each in an amount equal to one-hundred percent (100%) of the Contract Sum.

2. Add Section 7.1.4:

a. Bidder agrees to finally complete the Project and Contract awarded within the "allowable calendar days for completion" from the date of the Execution of the Contract and he/she further agrees that the Owner may retain from the monies which may become due the amount of Two Hundred Fifty U.S. Dollars **($250.00)** per day for each and every day that the completion of the Project may be delayed.

B. 7.2 - Time of Delivery and Form of Bonds:

1. Delete the first sentence of Section 7.2.1 and insert the following:

a. The Bidder shall deliver the required bonds to Owner no later than 10 days after the date of Notice of Intent to Award and no later than the date of execution of the Contract, whichever occurs first. Owner may deem the failure of the Bidder to deliver required bonds within the period of time allowed a default.

2. Delete Section 7.2.3 and insert the following:

a. 7.2.3 - Bonds shall be executed and be in force on the date of the execution of the Contract.

3. Add section 7.2.5

a. 7.2.5 - All sureties must either be authorized by the Insurance Commissioner of Georgia to do business in Georgia or must be on the United States Treasury's list of approved bond sureties. Proof of authorization by the Insurance Commissioner of Georgia to do business in Georgia or proof of its being on the United States Treasury's list of approved bond sureties must be included with each bond.

1.9 ARTICLE 8 - FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

A. AIA Document A101, "Standard form of Agreement between Owner and Contractor, Stipulated Sum"

1.10 ARTICLE 9 - EXECUTION OF THE CONTRACT

A. Add Article 9:

1. 9.1.1 - Subsequent to the Notice of Intent to Award, and within 10 days after the prescribed Form of Agreement is presented to the Awardee for signature, the Awardee shall execute and deliver the Agreement to Owner through Architect, in such number of counterparts as Owner may require.
2. 9.1.2 - Owner may deem as a default the failure of the Awardee to execute the Contract and to supply the required bonds when the Agreement is presented for signature within the period of time allowed.
3. 9.1.3 - Unless otherwise indicated in the Procurement and Contracting Documents or the executed Agreement, the date of commencement of the Work shall be the date of the executed Agreement.
4. 9.1.4 - In the event of a default, Owner may declare the amount of the Bid security forfeited and elect to either award the Contract to the next responsible Bidder or re-advertise for Bids.

END OF DOCUMENT 002213

# SECTION 002513 - PREBID MEETINGS

## 1.1 PREBID MEETING

A. Architect will conduct a Prebid meeting.
   1. Refer to Section **001113- Advertisement for bids** for Prebid meeting location, date and time.

B. Attendance:

   1. Prime bidders: Attendance at Prebid meeting is **encouraged but is non-mandatory**.

   2. Subcontractors: Attendance at Prebid meeting is **encouraged but is non-mandatory**.

C. Bidder Questions: Submit written questions to be addressed at Prebid meeting to the Architect by **forty-eight (48) hours prior** to the Prebid meeting date and time.

D. Agenda: Prebid meeting agenda will include review of topics that may affect proper preparation and submittal of bids, including the following:

   1. Procurement and Contracting Requirements:

      a. Advertisement for bids.
      b. Instructions to bidders.
      c. Bidder Qualifications.
      d. Bonding.
      e. Insurance.
      f. Bid Security.
      g. Bid Form and Attachments.
      h. Bid Submittal Requirements.
      i. Bid Submittal Checklist.
      j. Notice of Award.

   2. Communication during bidding Period:

      a. Obtaining documents.
      b. Access to Project Web site.
      c. Bidder's Requests for Information.
      d. Bidder's Substitution Request/Prior Approval Request.
      e. Addenda.

   3. Contracting Requirements:

      a. Agreement.
      b. The General Conditions.
      c. The Supplementary Conditions.
      d. Other Owner requirements.

4. Construction Documents:

    a. Scopes of Work.
    b. Temporary Facilities.
    c. Use of Site.
    d. Work Restrictions.
    e. Alternates, Allowances, and Unit Prices.
    f. Substitutions following award.

5. Separate Contracts:

    a. Work by Owner.
    b. Work of Other Contracts.

6. Schedule:

    a. Project Schedule.
    b. Contract Time.
    c. Liquidated Damages.
    d. Other Bidder Questions.

7. Site/facility visit or walkthrough.
8. Post-Meeting Addendum.

E. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes to attendees. Minutes of meeting are issued as Available Information and do not constitute a modification to the Procurement and Contracting Documents. Modifications to the Procurement and Contracting Documents are issued by written Addendum only.

1. Sign-in Sheet: Minutes will include list of meeting attendees.
2. List of Plan holders: Minutes will include list of plan holders.

END OF DOCUMENT 002513

# SECTION 002600 - PROCUREMENT SUBSTITUTION PROCEDURES

## 1.1 DEFINITIONS

A. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Procurement and Contracting Documents, submitted prior to receipt of bids.

B. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award. See Section 012500 "Substitution Procedures" for conditions under which Substitution requests will be considered following Contract award.

## 1.2 QUALITY ASSURANCE

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

## 1.3 PROCUREMENT SUBSTITUTIONS

A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment when the Specifications Sections list materials and equipment by product or manufacturer name.

B. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by Architect; otherwise, requests will be returned without action:

1. Extensive revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
3. The request is fully documented and properly submitted.

## 1.4 SUBMITTALS

A. Procurement Substitution Request: Submit to Architect. Procurement Substitution Request must be made in writing by prime contract Bidder only in compliance with the following requirements:

1. Requests for substitution of materials and equipment will be considered if received no later than the **Questions Deadline** indicated in **Section 00113 – Advertisement for Bids after which substitution requests will NOT be considered**.

2. Submittal Format: Submit one copy of each written Procurement Substitution Request via email, using form bound in the Project Manual (CSI Substitution Request Form 1.5C).

    a. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.
    b. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:
        1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
        2) Copies of current, independent third-party test data of salient product or system characteristics.
        3) Samples where applicable or when requested by Architect.
        4) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
        5) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
        6) Research reports, where applicable, evidencing compliance with building code in effect for Project, from applicable code organization.
        7) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.
    c. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
    d. Bidder, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.

B. Architect's Action:

    1. Architect may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Architect will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Procurement and Contracting Documents.

C. Architect's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

END OF DOCUMENT 002600

Advancement of Construction Technology

# SUBSTITUTION REQUEST

**(During the Bidding Phase)**

Project: _____ Substitution Request Number: _____

_____ From: _____

To: Cas Architecture, P.C. Date: _____

E-mail: csmith@casarc.com A/E Project Number: _____

Re: _____ Contract For: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No.: _____

Installer: _____ Address: _____ Phone: _____

History: ☐ New product ☐ 2-5 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point-by-point comparative data attached - REQUIRED BY Architect

Reason for not providing specified item: _____

_____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

_____

Savings to Owner for accepting substitution: _____ ($ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

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# SUBSTITUTION REQUEST
**(Continued)**

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

_____

Telephone: _____

Attachments: _____

A/E's REVIEW AND ACTION

☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by: Date:

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E ☐ _____

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September 1996
CSI Form 13.1A

# SECTION 003110 – PRELIMINARY CONSTRUCTION SCHEDULE

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. Work Included:

**1.** The Construction Schedule for the Project is provided in this section. This schedule includes specific dates shown in Items **1-14**.

### 1.2 GENERAL

A. See the Owner Contractor Agreement and General Conditions.

B. If all dates for Items **1** through **6** are maintained, then the dates for Items **6-14** become a fixed construction schedule.

C. Should the schedule for Items **5** through **6** be delayed, then all subsequent dates for Items **7** through **14** shall move forward by the same number of days Item **6** misses its schedule, except as conditions may be altered by the General and Supplementary Conditions.

### 1.3 SCHEDULE

A. The schedule dated for the project shall be strictly adhered to and are the last acceptable dates unless they are modified by mutual consent of the Owner and Contractor by written change order. All Dates indicate midnight unless otherwise stipulated.

B. PRELIMINARY SCHEDULE

| | | |
|---|---|---|
| **1.** | **Advertisement for Bids** | **March 26, 2026** |
| | a. Section 001113 – Advertisement for Bids | |
| **2.** | **Non-mandatory Pre-Bid Meeting** | **April 15, 2026 (11:00 am)** |
| | a. Section 001113 – Advertisement for Bids | |
| **3.** | **Last day for Bidder's Questions and Substitution Requests** | **April 22, 2026 (5:00 pm)** |
| | a. Section 001113 – Advertisement for Bids | |
| **4.** | **Last Addendum Date** | **April 24, 2026 (5:00 pm)** |
| | a. Section 001113 – Advertisement for Bids | |
| **5.** | **Sealed Bids Due (Bid Opening to follow)** | **May 1, 2026 (2:00 pm)** |
| | a. Section 001113 – Advertisement for Bids | |
| **6.** | **Tentative Notice of Award** | **May 19, 2026** |
| **7.** | **Contract Agreement Date / Start of Contract Time** | **TBD** |
| | a. Section 011000 - Summary | |
| **8.** | **Receipt of Contractor's Construction Schedule** | **14 days** from 6 |
| | a. Section 013200 – Construction Progress Documentation | |
| **9.** | **Receipt of Contractor's Schedule of Values** | **14 days** from 6 |
| **10.** | **Receipt of Bonds and Insurance** | **14 days** from 6 |
| **11.** | **Pre-construction Conferences** | **TBD** |
| | a. Section 011000 - Summary | |
| **12.** | **Substantial Completion** | **220 days** from 7 |
| | a. Section 001113 – Advertisement for Bids | |
| **13.** | **Final Completion** | **250 days** from 7 |
| | a. Section 001113 – Advertisement for Bids | |
| **14.** | **Delivery of Final Documents** | **250 days** from 7 |

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 003110

SECTION 003143 – PERMIT APPLICATION

1.1 PERMIT APPLICATION INFORMATION

A. Permit Application: The building permit for Project **will be** applied for by the **Architect on behalf of the Owner following the bid.**

B. **The Bidder is to include an allowance of $15,000.00 U.S. Dollars in their bid for permitting. Should the permit fee be waived, the allowance is to be credited back to the Owner.**

END OF DOCUMENT 003143

# SECTION 004113 - BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)

## 1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: **COLLINS P. LEE MEMORIAL LIBRARY**

C. Project Location: **237 Harrisburg RD. SW, Milledgeville, GA 31061**

D. Owner: **Middle Georgia Regional Library System**

E. Architect (Architect of Record): Cas Architecture, P.C.

1. Architect Representative: Chad Alexander Smith, AIA, LEED AP

F. Architect Project Number: # **25114**

## 1.2 CERTIFICATIONS AND BASE BID

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

1. _____ Dollars ($_____).
2. The above amount may be modified by amounts indicated by the Bidder on the attached Document 004322 "Unit Prices Form" and Document 004323 "Alternates Form."

## 1.3 BID GUARANTEE

A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 days after a written Notice of Award, if offered within 60 days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash, cashier's check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above:

1. _____ Dollars ($_____).

B. In the event Owner does not offer Notice of Award within the time limits stated above, Owner will return to the undersigned the cash, cashier's check, certified check, U.S. money order, or bid bond.

1.4 SUBCONTRACTORS AND SUPPLIERS

A. The following companies shall execute subcontracts for the portions of the Work indicated:

1. **Concrete Work:** _____.
2. **Framing Work:** _____.
3. **Masonry Work:** _____.
4. **Roofing Work:** _____.
5. **Plumbing Work:** _____.
6. **Mechanical Work:** _____.
7. **Electrical Work:** _____.

1.5 TIME OF COMPLETION

A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Execution of the Contract to be issued by Architect, and shall fully complete the Work within the time frame listed in **Section 001113 – Advertisement for Bids Sub Section 1.6B TIME OF COMPLETION** included as part of this Bid Form.

1.6 ACKNOWLEDGEMENT OF ADDENDA

A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

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

1.7 BID SUPPLEMENTS

A. The following supplements are a part of this Bid Form and are attached hereto.

1. Bid Form Supplement: Section 004313.1 - AIA Document A310 - 2010 Bid Bond.
2. Bid Form Supplement: Section 004321 - Allowance Form.
3. Bid Form Supplement: Section 004322 - Unit Prices Form.
4. Bid Form Supplement: Section 004323 - Alternates Form.

1.8 CONTRACTOR'S LICENSE

A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in **The State of Georgia** and overseeing **applicable jurisdiction(s) governing the location in which the project resides**, and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

1.9 SUBMISSION OF BID

A. Respectfully submitted this ____ day of _____, **2026**.

B. Submitted By_____(Name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

F. Witness By:_____(Handwritten signature).

G. Attest:_____(Handwritten signature).

H. By:_____(Type or print name).

I. Title:_____(Corporate Secretary or Assistant Secretary).

J. Street Address:_____.

K. City, State, Zip_____.

L. Phone:_____.

M. License No.:_____.

N. Federal ID No.:_____(Affix Corporate Seal Here).

END OF DOCUMENT 004113

# SECTION 004313 - BID SECURITY FORMS

## 1.1 BID FORM SUPPLEMENT

A. A completed bid bond form is required to be attached to the Bid Form.

## 1.2 BID BOND FORM

A. **AIA Document A310, "Bid Bond,"** is the requested form for a bid bond. A bid bond acceptable to Owner, or other bid security as described in the Instructions to Bidders, is required to be attached to the Bid Form as a supplement. This Bid Bond form is bound in the Project Manual.

B. Bid security shall be submitted with each bid in the amount of **5 percent** of the bid amount. No bids may be withdrawn for a period of **sixty (60)** days after opening of bids. Owner reserves the right to reject any and all bids and to waive informalities and irregularities.

C. All sureties must either be authorized by the Insurance Commissioner of Georgia to do business in Georgia or must be in the United States Treasury's list of approved bond sureties. Proof of authorization by the insurance Commissioner of Georgia to do business in Georgia or proof of its being on the United States Treasury's list of approved bond sureties must be included with each bond.

D. Copies of AIA standard forms may be obtained from The American Institute of Architects: www.aia.org/contractdocs/purchase/index.htm;
email: docspurchases@aia.org; (800) 942-7732.

END OF DOCUMENT 004313

# AIA® Document A310™ – 2010

## *Bid Bond*

**CONTRACTOR:**
*(Name, legal status and address)*

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

**OWNER:**
*(Name, legal status and address)*
OWNER NAME
OWNER ADDRESS

**BOND AMOUNT:** $

**PROJECT:**
*(Name, location or address, and Project number, if any)*
PROJECT NAME
PROJECT ADDRESS

**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.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so

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**User Notes:** (809582904)

furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this day of ,

| | |
|---|---|
| | *(Contractor as Principal)* *(Seal)* |
| **–See attached digital signatures page–** | |
| *(Witness)* | *(Title)* |
| | *(Surety)* *(Seal)* |
| **–See attached digital signatures page–** | |
| *(Witness)* | *(Title)* |

Init.
/
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# Digital Signatures Page



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**User Notes:** (809582904)

# *Additions and Deletions Report for*

## *AIA® Document A310™ – 2010*

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 12:26:08 on 11/07/2016.

**PAGE 1**

OWNER NAME
OWNER ADDRESS

...

PROJECT NAME
PROJECT ADDRESS

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**User Notes:** (809582904)

# *Certification of Document's Authenticity*

*AIA® Document D401™ – 2003*

I, Chad A Smith, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 12:26:08 on 11/07/2016 under Order No. 6333509677_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A310™ – 2010, Bid Bond, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

*(Signed)*

_____

*(Title)*

_____

*(Dated)*

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**User Notes:** (809582904)

# SECTION 004321 - ALLOWANCE FORM

## 1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: **COLLINS P. LEE MEMORIAL LIBRARY**

C. Project Location: **237 Harrisburg RD. SW, Milledgeville, GA 31061**

D. Owner: **Middle Georgia Regional Library System**

E. Architect (Architect of Record): Cas Architecture, P.C.

1. Architect Representative: Chad Alexander Smith, AIA, RID, LEED AP

F. Architect Project Number: # **25114**

## 1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

B. The undersigned Bidder certifies that Base Bid submission to which this Bid Supplement is attached includes those allowances described in the Contract Documents and scheduled in Section 012100 "Allowances."

## 1.3 ALLOWANCES

A. **Permitting Fee: Refer to Specification SECTION 003143 – PERMIT APPLICATION for permit allowance and Refer to Specification SECTION 012123 – CONTINGENCY ALLOWANCE for Contingency allowance.**

## 1.4 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this ____ day of _____, **2026**.

B. Submitted By:_____(Insert name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title: _____(Owner/Partner/President/Vice President).

END OF DOCUMENT 004321

# DOCUMENT 004322 - UNIT PRICES FORM

## 1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: **COLLINS P. LEE MEMORIAL LIBRARY**

C. Project Location: **237 Harrisburg RD SW, Milledgeville, GA 31061**

D. Owner: **Middle Georgia Regional Library System**

E. Architect (Architect of Record): Cas Architecture, P.C.

1. Architect Representative: Chad Alexander Smith, AIA, RID, LEED AP

F. Architect Project Number: # **25114**

## 1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

B. The undersigned Bidder proposes the amounts below be added to or deducted from the Contract Sum on performance and measurement of the individual items of Work and for adjustment of the quantity given in the Unit-Price Allowance for the actual measurement of individual items of the Work.

C. If the unit price does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

D. **Refer to SECTION 012200 – UNIT PRICES for additional information and requirements.**

E. **The Bidder acknowledges the measurement method for all estimated Unit-Price quantities is "As measured IN PLACE" and any other method is NOT acceptable.**

## 1.3 UNIT PRICES

**UNSUITABLE MATERIAL**

A. **Unit-Price No. 1: Removal and disposal off site of UNSUITABLE MATERIALS.**

1.

a. Description: Removal of unsuitable soils and materials from site and disposal off site at location determined by Contractor.
b. Unit of Measurement: Cubic Yard

2. _____ Dollars ($_____) per unit.

B. **Unit-Price No. 2: Removal and disposal on site of UNSUITABLE MATERIALS.**

1.
   a. Description: Removal of unsuitable soils and materials from site and disposal on site.
   b. Unit of Measurement: Cubic Yard

2. _____ Dollars ($_____) per unit.

**MASS ROCK**

C. **Unit-Price No. 3: Excavate, haul off site and dispose of MASS ROCK.**

1.
   a. Description: Excavation and removal of mass rock from site that interferes with the building structure and installation of new soils and disposal off site at location determined by Contractor.
   b. Unit of Measurement: Cubic Yard

2. _____ Dollars ($_____) per unit.

D. **Unit-Price No. 4: Excavate and burying of MASS ROCK on site.**

1.
   a. Description: Excavation and removal of mass rock from site that interferes with the building structure and installation of new soils and burying on site.
   b. Unit of Measurement: Cubic Yard

2. _____ Dollars ($_____) per unit.

**TRENCH ROCK**

E. **Unit-Price No. 5: Excavate, haul off site and dispose of TRENCH ROCK.**

1.
   a. Description: Excavation and removal of trench rock from site that interferes with the building structure and installation of new soils and disposal off site at location determined by Contractor.
   b. Unit of Measurement: Per ton.

2. _____ Dollars ($_____) per unit.

F. **Unit-Price No. 6: Excavate and burying of TRENCH ROCK on site.**

1.
   a. Description: Excavation and removal of trench rock from site that interferes with the building structure and installation of new soils and burying on site.
   b. Unit of Measurement: Cubic Yard

2. _____ Dollars ($_____) per unit.

**SUITABLE SOIL**

G. **Unit-Price No. 7: Provide SUITABLE SOIL from off site and compact in-place.**
1.
   a. Description: Provide suitable soil from an off site location determined by the Contractor and compact in-place.
   b. Unit of Measurement: Cubic Yard

2. _____ Dollars ($_____) per unit.

H. **Unit-Price No. 8: Provide SUITABLE SOIL from on site and compact in-place.**
1.
   a. Description: Provide suitable soil from on site and compact in-place.
   b. Unit of Measurement: Cubic Yard

2. _____ Dollars ($_____) per unit.

**STONE AND GEOTECHNICAL FABRIC**

**Note: Material to be used as directed by Architect, without restriction, at the Unit Process shown. For example but not limited to, remedial footing subgrade, subgrade stabilization, remedial slab subgrade or drainage course, to replace excavated rock or unsuitable soil.**

I. **Unit-Price No. 9: Haul in and placement of #57 stone.**
1.
   a. Description: Haul in from off site and placement of #57 stone on site.
   b. Unit of Measurement: Tons

2. _____ Dollars ($_____) per unit.

J. **Unit-Price No. 10: Haul in and placement of surge stone (stones ranging from grapefruit size to football size).**
1.
   a. Description: Haul in from off site and placement surge stone. (stones ranging from grapefruit size to football size).
   b. Unit of Measurement: Tons

2. _____ Dollars ($_____) per unit.

K. **Unit-Price No. 11: Haul in and placement of graded aggregate base (G.A.B.)**
1.
   a. Description: Haul in from off site and placement of graded aggregate base sufficiently compacted.
   b. Unit of Measurement: Tons

2. _____ Dollars ($_____) per unit.

L. **Unit-Price No. 12: Material and placement of geotechnical fabric**

1.

a. Description: Material and placement of Mirafi 600x geotechnical fabric or equal.
b. Unit of Measurement: Square Yard

2. _____ Dollars ($_____) per unit.

**CONCRETE**

M. **Unit-Price No. 13: Addition of structural and miscellaneous concrete**

1.

a. Description: Material and placement of structural and miscellaneous concrete.
b. Unit of Measurement: Tons

2. _____ Dollars ($_____) per unit.

**WOOD**

N. **Unit-Price No. 14: Wood Decking**

1.

a. Description: Remove damaged plywood decking concealed by existing construction and purchase and install new decking to match existing.
b. Unit of Measurement: Square Foot

2. _____ Dollars ($_____) per unit.

**DEWATERING**

O. **Unit-Price No. 15: Dewatering**

1.

a. Description: All dewatering necessary to install below design grade item.
b. Unit of Measurement: Lump sum per week

2. _____ Dollars ($_____) per unit.

1.4 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this ____ day of _____, **2025**.

B. Submitted By:_____(Insert name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

END OF DOCUMENT 004322

# SECTION 004323 - ALTERNATES FORM

## 1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name**: COLLINS P. LEE MEMORIAL LIBRARY**

C. Project Location: **237 Harrisburg RD. SW, Milledgeville, GA 31061**

D. Owner: **Middle Georgia Regional Library System**

E. Architect (Architect of Record): Cas Architecture, P.C.

1. Architect Representative: Chad Alexander Smith, AIA, RID, LEED AP

F. Architect Project Number: # **25114**

## 1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

B. **Refer to SECTION 012300 – ALTERNATES for additional information and requirements.**

## 1.3 DESCRIPTION

A. The undersigned Bidder proposes the amount below be added to or deducted from the Base Bid if particular alternates are accepted by Owner. Amounts listed for each alternate include costs of related coordination, modification, or adjustment.

1. Cost-Plus-Fee Contract: Alternate price given below includes adjustment to Contractor's Fee.

B. If the alternate does not affect the Contract Sum, the Bidder shall indicate "NO CHANGE."

C. If the alternate does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

D. The Bidder shall be responsible for determining from the Contract Documents the effects of each alternate on the Contract Time and the Contract Sum.

E. Owner reserves the right to accept or reject any alternate, in any order, and to award or amend the Contract accordingly within **sixty (60)** calendar days of the Notice of Award unless otherwise indicated in the Contract Documents.

F. Acceptance or non-acceptance of any alternates by the Owner shall have no effect on the Contract Time unless the "Schedule of Alternates" Article below provides a formatted space for the adjustment of the Contract Time.

1.4 SCHEDULE OF ALTERNATES

A. **Alternate No. 1: In lieu of interior storefront assemblies, provide Steelcase "Everwall" system.**

1. ADD___ DEDUCT___ NO CHANGE____ NOT APPLICABLE____.
2. _____ Dollars ($_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

B. **Alternate No. 2: In lieu of 80 mil TPO roofing membrane, provide 60 mil TPO roofing membrane.**

1. ADD___ DEDUCT___ NO CHANGE____ NOT APPLICABLE____.
2. _____ Dollars ($_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

1.5 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this ____ day of _____, **2026**.

B. Submitted By:_____(Name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

END OF DOCUMENT 004323

# SECTION 004393 - BID SUBMITTAL CHECKLIST

## 1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: **COLLINS P. LEE MEMORIAL LIBRARY**

C. Project Location: **237 Harrisburg RD. SW, Milledgeville GA 31061**

D. Owner: **Middle Georgia Regional Library System**

E. Architect (Architect of Record): Cas Architecture, P.C.

## 1.2 BIDDER'S CHECKLIST

A. In an effort to assist the Bidder in properly completing all documentation required, the following checklist is provided for the Bidder's convenience. The Bidder is solely responsible for verifying compliance with bid submittal requirements.

B. Attach this completed checklist to the outside of the Submittal envelope. Only one copy of each is required.

1. Used the Bid Form provided in the Project Manual.
2. Prepare the Bid Form as required by the Instructions to Bidders.
3. Indicated on the Bid Form the Addenda received.
4. Attached to the Bid Form: Bid Supplement Form - Allowances.
5. Attached to the Bid Form: Bid Supplement Form - Unit Prices.
6. Attached to the Bid Form: Bid Supplement Form - Alternates.
7. Attached to the Bid Form: Bid Bond OR a certified check for the amount required, including proof of authorization by the Insurance Commissioner of Georgia to do business in Georgia or proof of its being on the United States Treasury's list of approved bond sureties included with bond.
8. Bid envelope shows name and address of the Bidder.
9. Bid envelope shows the Bidder's Contractor's License Number.
10. Bid envelope shows name of Project being bid.
11. Bid envelope shows name of Prime Contract being bid, if applicable.
12. Bid envelope shows time and day of Bid Opening.
13. Verified that the Bidder can provide executed Performance Bond and Labor and Material Bond.
14. Verified that the Bidder can provide Certificates of Insurance in the amounts indicated.

END OF DOCUMENT 004393

# SECTION 006000 – PROJECT FORMS

## 1.1 FORM OF AGREEMENT AND GENERAL CONDITIONS

A. The following form of Owner/Contractor Agreement and form of the General Conditions shall be used for Project:

1. **Section 007213.1 - AIA Document A101-2007, "Standard Form of Agreement between Owner and Contractor, Stipulated Sum."**

   **a. The General Conditions for Project are Section 007213 - AIA Document A201-2007, "General Conditions of the Contract for Construction."**

2. The General Conditions are included in the Project Manual.

## 1.2 ADMINISTRATIVE FORMS

A. Administrative Forms: Additional administrative forms are specified in Division 01 General Requirements.

B. Copies of AIA standard forms may be obtained from the American Institute of Architects; http://www.aia.org/contractdocs/purchase/index.htm; docspurchases@aia.org; (800) 942-7732.

C. Bid Forms:

1. Bid Bond:
   **Section 004313.1- AIA Document A310-2010, "Bid Bond"**

D. Preconstruction Forms – **To be delivered to the Architect Fourteen (14) Calendar days after the date of the Contract unless noted otherwise**:

1. List of Subcontractors:
   **Section 006286 - AIA Document A705-2001, "List of Subcontractors"**
2. Form of Performance Bond and Labor and Material Bond:
   **Section 006113.13 - AIA Document A312-2010, "Performance Bond"**
   **Section 006113.16 - AIA Document A312-2010, "Payment Bond"**
3. Form of Certificate of Insurance:
   **Section 007316 - AIA Document G715-1991, "Supplemental Attachment for ACORD Certificate of Insurance 25-S"**

E. Information and Modification Forms:

1. Form for Requests for Information (RFIs):
   **Section 006313 - AIA Document G716-2004, "Request for Information (RFI)"**
2. Form of Request for Proposal:
   **Section 006353 - AIA Document G709-2001, "Work Changes Proposal Request"**
3. Change Order Form:
   **Section 006357 - AIA Document G701-2001, "Change Order"**
4. Form of Architect's Memorandum for Minor Changes in the Work:
   **Section 006333 - AIA Document G710-1992, "Architect's Supplemental Instructions"**
5. Form of Change Directive:
   **Section 006346 - AIA Document G714-2007, "Construction Change Directive"**

F. Payment Forms:

1. Schedule of Values Form:
   **Section 006273 - AIA Document G703-1992, "Continuation Sheet"**
2. Payment Application:
   **Section 006276 - AIA Document G702-1992, "Application and Certificate for Payment"**
3. Form of Contractor's Affidavit:
   **Section 006519.13 - AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims"**
4. Form of Affidavit of Release of Liens:
   **Section 006519.16 - AIA Document G706A-1994, "Contractor's Affidavit of Payment of Release of Liens"**
5. Form of Consent of Surety:
   **Section 006519.19 - AIA Document G707-1994, "Consent of Surety to Final Payment"**

END OF DOCUMENT 006000

# AIA® Document A312™ – 2010

## *Performance Bond*

**CONTRACTOR:**
*(Name, legal status and address)*

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

**OWNER:**
*(Name, legal status and address)*

**CONSTRUCTION CONTRACT**
Date:
Amount: $
Description:
*(Name and location)*
PROJECT NAME
PROJECT ADDRESS

**BOND**
Date:
*(Not earlier than Construction Contract Date)*

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

**CONTRACTOR AS PRINCIPAL**
Company: *(Corporate Seal)*
**–See attached digital signatures page–**
Signature:
Name and Title:

**SURETY**
Company: *(Corporate Seal)*
**–See attached digital signatures page–**
Signature:
Name and Title:

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

*(FOR INFORMATION ONLY — Name, address and telephone)*
**AGENT** or **BROKER:**

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

**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.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

Init.
/
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**§ 1** The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

**§ 2** If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

**§ 3** If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

**.1** the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

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

**.3** the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

**§ 4** Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

**§ 5** When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

**§ 5.1** Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

**§ 5.2** Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

**§ 5.3** Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

**§ 5.4** Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

**.1** After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

**.2** Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

**§ 6** If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.


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**User Notes:** (1395745638)

**§ 7** If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

**.1** the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

**.2** additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and

**.3** liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

**§ 8** If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

**§ 9** The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

**§ 10** The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

**§ 11** Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

**§ 12** Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

**§ 13** When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

**§ 14 Definitions**

**§ 14.1 Balance of the Contract Price.** The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

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

**§ 14.3 Contractor Default.** Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

**§ 14.4 Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

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


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**User Notes:** (1395745638)

**§ 15** If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

**§ 16** Modifications to this bond are as follows:

*(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)*

| **CONTRACTOR AS PRINCIPAL** | | **SURETY** | |
|---|---|---|---|
| Company: | *(Corporate Seal)* | Company: | *(Corporate Seal)* |
| Signature: | **–See attached digital signatures page–** | Signature: | **–See attached digital signatures page–** |
| Name and Title: | | Name and Title: | |
| Address: | | Address: | |


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## *AIA® Document A312™ – 2010*

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Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 12:27:53 on 11/07/2016.

**PAGE 1**

PROJECT NAME
PROJECT ADDRESS

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**User Notes:** (1395745638)

# *Certification of Document's Authenticity*

*AIA® Document D401™ – 2003*

I, Chad A Smith, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 12:27:53 on 11/07/2016 under Order No. 6333509677_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A312™ – 2010, Performance Bond, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

*(Signed)*

_____

*(Title)*

_____

*(Dated)*

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**User Notes:** (1395745638)

# AIA® Document A312™ – 2010

## *Payment Bond*

**CONTRACTOR:**
*(Name, legal status and address)*

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

**OWNER:**
*(Name, legal status and address)*

**CONSTRUCTION CONTRACT**
Date:
Amount: $
Description:
*(Name and location)*
PROJECT NAME
PROJECT ADDRESS

**BOND**
Date:
*(Not earlier than Construction Contract Date)*

Amount: $
Modifications to this Bond: ☐ None ☐ See Section 18

**CONTRACTOR AS PRINCIPAL**
Company: *(Corporate Seal)*
**–See attached digital signatures page–**
Signature:
Name and Title:

**SURETY**
Company: *(Corporate Seal)*
**–See attached digital signatures page–**
Signature:
Name and Title:

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

*(FOR INFORMATION ONLY — Name, address and telephone)*
**AGENT** or **BROKER:**

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

**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.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

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**User Notes:** (1668239460)

**§ 1** The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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


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

**§ 11** The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

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

**§ 13** Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

**§ 14** When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

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

**§ 16 Definitions**

**§ 16.1 Claim.** A written statement by the Claimant including at a minimum:

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

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

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


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**§ 16.4 Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

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

**§ 17** If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

**§ 18** Modifications to this bond are as follows:

*(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)*

| **CONTRACTOR AS PRINCIPAL** | | **SURETY** | |
|---|---|---|---|
| Company: | *(Corporate Seal)* | Company: | *(Corporate Seal)* |
| Signature: | **–See attached digital signatures page–** | Signature: | **–See attached digital signatures page–** |
| Name and Title: | | Name and Title: | |
| Address: | | Address: | |


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**User Notes:** (1668239460)

# *Additions and Deletions Report for*

## *AIA® Document A312™ – 2010*

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

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**PAGE 1**

PROJECT NAME
PROJECT ADDRESS

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# *Certification of Document's Authenticity*

*AIA® Document D401™ – 2003*

I, Chad A Smith, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 12:27:00 on 11/07/2016 under Order No. 6333509677_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A312™ – 2010, Payment Bond, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

*(Signed)*

_____

*(Title)*

_____

*(Dated)*

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# AIA® Document G703™ – 1992

## Continuation Sheet

AIA Document, G702™–1992, Application and Certification for Payment, or G736™–2009, Project Application and Project Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.
In tabulations below, amounts are in US dollars.
Use Column I on Contracts where variable retainage for line items may apply.

**APPLICATION NO:** 001
**APPLICATION DATE:**
**PERIOD TO:**
**ARCHITECT'S PROJECT NO:**

| A | B | C | D | E | F | G | | H | I |
|---|---|---|---|---|---|---|---|---|---|
| ITEM NO. | DESCRIPTION OF WORK | SCHEDULED VALUE | WORK COMPLETED | | MATERIALS PRESENTLY STORED (NOT IN D OR E) | TOTAL COMPLETED AND STORED TO DATE (D+E+F) | % (G ÷ C) | BALANCE TO FINISH (C - G) | RETAINAGE (IF VARIABLE RATE) |
| | | | FROM PREVIOUS APPLICATION (D + E) | THIS PERIOD | | | | | |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 % | 0.00 | 0.00 |
| | **GRAND TOTAL** | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | 0.00 % | $0.00 | $0.00 |

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**User Notes:** (796484691)

# AIA® Document G702™ – 1992

## *Application and Certificate for Payment*

**TO OWNER:**

**PROJECT:**

**APPLICATION NO:** 001
**PERIOD TO:**
**CONTRACT FOR:** General Construction
**CONTRACT DATE:**
**PROJECT NOS:** / /

**Distribution to:**
OWNER:
ARCHITECT:
CONTRACTOR:
FIELD:
OTHER:

**FROM CONTRACTOR:**

**VIA ARCHITECT:**

## CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, AIA Document G703, is attached.

| | | |
|---|---|---|
| **1. ORIGINAL CONTRACT SUM** | $ | 0.00 |
| **2. NET CHANGE BY CHANGE ORDERS** | $ | 0.00 |
| **3. CONTRACT SUM TO DATE** (Line 1 ± 2) | $ | 0.00 |
| **4. TOTAL COMPLETED & STORED TO DATE** (Column G on G703) | $ | 0.00 |
| **5. RETAINAGE:** | | |
| **a.** 0 % of Completed Work (Column D + E on G703) | $ | 0.00 |
| **b.** 0 % of Stored Material (Column F on G703) | $ | 0.00 |
| Total Retainage (Lines 5a + 5b or Total in Column I of G703) | $ | 0.00 |
| **6. TOTAL EARNED LESS RETAINAGE** (Line 4 Less Line 5 Total) | $ | 0.00 |
| **7. LESS PREVIOUS CERTIFICATES FOR PAYMENT** (Line 6 from prior Certificate) | $ | 0.00 |
| **8. CURRENT PAYMENT DUE** | $ | 0.00 |
| **9. BALANCE TO FINISH, INCLUDING RETAINAGE** (Line 3 less Line 6) | $ | 0.00 |

| CHANGE ORDER SUMMARY | ADDITIONS | DEDUCTIONS |
|---|---|---|
| Total changes approved in previous months by Owner | $ 0.00 | $ 0.00 |
| Total approved this Month | $ 0.00 | $ 0.00 |
| TOTALS | $ 0.00 | $ 0.00 |
| NET CHANGES by Change Order | $ 0.00 | |

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

**CONTRACTOR:**

**–See attached digital signatures page–**

By: _____ Date: _____

State of:

County of:

Subscribed and sworn to before me this day of

Notary Public:

My Commission expires:

## ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

**AMOUNT CERTIFIED** ..... $ 0.00

*(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)*

**ARCHITECT:**

**–See attached digital signatures page–**

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

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# AIA® Document G705™ – 2001

## *List of Subcontractors*

**PROJECT:** *(Name and address)*

**DATE:**

**TO ARCHITECT:** *(Name and address)*

**ARCHITECT'S PROJECT NUMBER:**

**FROM CONTRACTOR:** *(Name and address)*

**CONTRACTOR'S PROJECT NUMBER:**

*(List Subcontractors and others proposed to be employed on the above Project as required by the bidding documents.)*

| Work/Firm Name | Address/Phone | Superintendent |
|---|---|---|

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# AIA® Document G710™ – 1992

## *Architect's Supplemental Instructions*

**PROJECT** *(Name and address)*:

**ARCHITECT'S SUPPLEMENTAL INSTRUCTION NO:** 001

OWNER: ☐
ARCHITECT: ☐
CONSULTANT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER: ☐

**OWNER** *(Name and address)*:

**DATE OF ISSUANCE:**

**CONTRACT FOR:** General Construction

**FROM ARCHITECT** *(Name and address)*:

**CONTRACT DATE:**

**TO CONTRACTOR** *(Name and address)*:

**ARCHITECT'S PROJECT NUMBER:**

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgment that there will be no change in the Contract Sum or Contract Time.

**DESCRIPTION:**

**ATTACHMENTS:**
*(Here insert listing of documents that support description.)*

**ISSUED BY THE ARCHITECT:**

**–See attached digital signatures page–**

*(Signature)*

*(Printed name and title)*

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**User Notes:** (1782079851)

# AIA® Document G710™ – 1992

## *Architect's Supplemental Instructions*

**PROJECT** *(Name and address)*:

**ARCHITECT'S SUPPLEMENTAL INSTRUCTION NO:** 001

OWNER: ☐
ARCHITECT: ☐
CONSULTANT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER: ☐

**OWNER** *(Name and address)*:

**DATE OF ISSUANCE:**

**CONTRACT FOR:** General Construction

**FROM ARCHITECT** *(Name and address)*:

**CONTRACT DATE:**

**TO CONTRACTOR** *(Name and address)*:

**ARCHITECT'S PROJECT NUMBER:**

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgment that there will be no change in the Contract Sum or Contract Time.

**DESCRIPTION:**

**ATTACHMENTS:**
*(Here insert listing of documents that support description.)*

**ISSUED BY THE ARCHITECT:**

**–See attached digital signatures page–**

*(Signature)*

*(Printed name and title)*

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# AIA® Document G714™ – 2007

## *Construction Change Directive*

**PROJECT:** *(Name and address)*

**DIRECTIVE NUMBER:** 001
**DATE:**
**CONTRACT FOR:** General Construction

**TO CONTRACTOR:** *(Name and address)*

**CONTRACT DATED:**
**ARCHITECT'S PROJECT NUMBER:**

OWNER: ☐
ARCHITECT: ☐
CONSULTANT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER: ☐

You are hereby directed to make the following change(s) in this Contract:
*(Describe briefly any proposed changes or list any attached information in the alternative)*

**PROPOSED ADJUSTMENTS**

**1.** The proposed basis of adjustment to the Contract Sum or Guaranteed Maximum Price is:

- ☒ • Lump Sum decrease of $0.00
- ☐ • Unit Price of $ per
- ☐ • As provided in Section 7.3.3 of AIA Document A201-2007
- ☐ • As follows:

**2.** The Contract Time is proposed to (remain unchanged). The proposed adjustment, if any, is 0 days.

When signed by the Owner and Architect and received by the Contractor, this document becomes effective IMMEDIATELY as a Construction Change Directive (CCD), and the Contractor shall proceed with the change(s) described above.

Contractor signature indicates agreement with the proposed adjustments in Contract Sum and Contract Time set forth in this CCD.

| **ARCHITECT** *(Firm name)* | **OWNER** *(Firm name)* | **CONTRACTOR** *(Firm name)* |
|---|---|---|
| **ADDRESS** | **ADDRESS** | **ADDRESS** |
| **–See attached digital signatures page–** | **–See attached digital signatures page–** | **–See attached digital signatures page–** |
| **BY** *(Signature)* | **BY** *(Signature)* | **BY** *(Signature)* |
| *(Typed name)* | *(Typed name)* | *(Typed name)* |
| **DATE** | **DATE** | **DATE** |

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# AIA® Document G709™ – 2001

## *Work Changes Proposal Request*

**PROJECT** *(Name and address)*:

**OWNER** *(Name and address)*:

**FROM ARCHITECT** *(Name and address)*:

**TO CONTRACTOR** *(Name and address)*:

**PROPOSAL REQUEST NUMBER:** 001

**DATE OF ISSUANCE:**

**CONTRACT FOR:** General Construction

**CONTRACT DATE:**

**ARCHITECT'S PROJECT NUMBER:**

OWNER: ☐
ARCHITECT: ☐
CONSULTANT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER: ☐

Please submit an itemized proposal for changes in the Contract Sum and Contract Time for proposed modifications to the Contract Documents described herein. Within Zero (0) days, the Contractor must submit this proposal or notify the Architect, in writing, of the date on which proposal submission is anticipated.

**THIS IS NOT A CHANGE ORDER, A CONSTRUCTION CHANGE DIRECTIVE OR A DIRECTION TO PROCEED WITH THE WORK DESCRIBED IN THE PROPOSED MODIFICATIONS.**

**DESCRIPTION** *(Insert a written description of the Work)*:

**ATTACHMENTS** *(List attached documents that support description)*:

**REQUESTED BY THE ARCHITECT:**

**–See attached digital signatures page–**

*(Signature)* *(Printed name and title)*

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# AIA® Document G701™ – 2001

## Change Order

**PROJECT** *(Name and address)*:

**CHANGE ORDER NUMBER:** 001
**DATE:**

**TO CONTRACTOR** *(Name and address)*:

**ARCHITECT'S PROJECT NUMBER:**
**CONTRACT DATE:**
**CONTRACT FOR:** General Construction

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER: ☐

**THE CONTRACT IS CHANGED AS FOLLOWS:**
*(Include, where applicable, any undisputed amount attributable to previously executed Construction Change Directives)*

| | | |
|---|---|---|
| The original Contract Sum was | $ | 0.00 |
| The net change by previously authorized Change Orders | $ | 0.00 |
| The Contract Sum prior to this Change Order was | $ | 0.00 |
| The Contract Sum will be increased by this Change Order in the amount of | $ | 0.00 |
| The new Contract Sum including this Change Order will be | $ | 0.00 |

The Contract Time will be increased by Zero (0) days.
The date of Substantial Completion as of the date of this Change Order therefore is

**NOTE:** This Change Order does not include changes in the Contract Sum, Contract Time or Guaranteed Maximum Price which have been authorized by Construction Change Directive until the cost and time have been agreed upon by both the Owner and Contractor, in which case a Change Order is executed to supersede the Construction Change Directive.

**NOT VALID UNTIL SIGNED BY THE ARCHITECT, CONTRACTOR AND OWNER.**

| ARCHITECT *(Firm name)* | CONTRACTOR *(Firm name)* | OWNER *(Firm name)* |
|---|---|---|
| ADDRESS<br>**–See attached digital signatures page–** | ADDRESS<br>**–See attached digital signatures page–** | ADDRESS<br>**–See attached digital signatures page–** |
| BY *(Signature)* | BY *(Signature)* | BY *(Signature)* |
| *(Typed name)* | *(Typed name)* | *(Typed name)* |
| DATE | DATE | DATE |

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# AIA® Document G706™ – 1994

## *Contractor's Affidavit of Payment of Debts and Claims*

**PROJECT:** *(Name and address)*

**TO OWNER:** *(Name and address)*

**ARCHITECT'S PROJECT NUMBER:**

**CONTRACT FOR:** General Construction

**CONTRACT DATED:**

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
SURETY: ☐
OTHER: ☐

**STATE OF:**
**COUNTY OF:**

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

**EXCEPTIONS:**

SUPPORTING DOCUMENTS ATTACHED HERETO:

**1.** Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA Document G707, Consent of Surety, may be used for this purpose

Indicate Attachment ☐ Yes ☒ No

*The following supporting documents should be attached hereto if required by the Owner:*

**1.** Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

**2.** Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

**3.** Contractor's Affidavit of Release of Liens (AIA Document G706A).

**CONTRACTOR:** *(Name and address)*

BY: **–See attached digital signatures page–**

*(Signature of authorized representative)*

*(Printed name and title)*

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

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**User Notes:** (1162106421)

# AIA® Document G706A™ – 1994

## *Contractor's Affidavit of Release of Liens*

| | | |
|---|---|---|
| **PROJECT:** *(Name and address)* | **ARCHITECT'S PROJECT NUMBER:** | OWNER: ☐ |
| | | ARCHITECT: ☐ |
| | **CONTRACT FOR:** General Construction | CONTRACTOR: ☐ |
| **TO OWNER:** *(Name and address)* | **CONTRACT DATED:** | SURETY: ☐ |
| | | OTHER: ☐ |

**STATE OF:**
**COUNTY OF:**

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

**EXCEPTIONS:**

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

**CONTRACTOR:** *(Name and address)*

BY: **–See attached digital signatures page–**

*(Signature of authorized representative)*

*(Printed name and title)*

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

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**User Notes:** (1970680929)

# AIA® Document G707™ – 1994

## *Consent Of Surety to Final Payment*

| | | |
|---|---|---|
| **PROJECT:** *(Name and address)* | **ARCHITECT'S PROJECT NUMBER:** | OWNER: ☐ |
| | **CONTRACT FOR:** General Construction | ARCHITECT: ☐ |
| **TO OWNER:** *(Name and address)* | **CONTRACT DATED:** | CONTRACTOR: ☐ |
| | | SURETY: ☐ |
| | | OTHER: ☐ |

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
*(Insert name and address of Surety)*

, SURETY,

on bond of
*(Insert name and address of Contractor)*

, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to
*(Insert name and address of Owner)*

, OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
*(Insert in writing the month followed by the numeric date and year.)*

*(Surety)*

**–See attached digital signatures page–**

*(Signature of authorized representative)*

Attest:
*(Seal)*:

*(Printed name and title)*

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# AIA® Document A201™ – 2007

## *General Conditions of the Contract for Construction*

**for the following PROJECT:**
*(Name and location or address)*
PROJECT NAME
PROJECT ADDRESS
General construction services for the PROJECT NAME.

**THE OWNER:**
*(Name, legal status and address)*
OWNER NAME
OWNER ADDRESS

**THE ARCHITECT:**
*(Name, legal status and address)*
CAS Architecture, P.C.
1485 Natchez Way
Grayson, GA 30017-2930
Telephone: 678-646-7736 E-mail: csmith@casarc.com

**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.

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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 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 and certify termination of the Agreement under Section 14.2.2.

### § 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.


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**§ 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 will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment 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 this 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 material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them 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 material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

### § 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

## 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 INFORMATION AND SERVICES REQUIRED OF THE OWNER

**§ 2.2.1** Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or


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the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

**§ 2.2.2** 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.

**§ 2.2.3** 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.

**§ 2.2.4** 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.

**§ 2.2.5** 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.

### § 2.3 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.

### § 2.4 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 written 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 deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor 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. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

## 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 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.


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## § 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 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

**§ 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 make 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 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, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and 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 written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required 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


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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 authorized by the Architect in accordance with Sections 3.12.8 or 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

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.

### § 3.6 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 21 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 an equitable adjustment 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 in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed 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


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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 furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply 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 SCHEDULES

**§ 3.10.1** The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

**§ 3.10.2** The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be 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, 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.


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### § 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be 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 the way by which 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 requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing 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 written 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


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required to provide professional services in violation of applicable law. 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 cause such services or certifications to be provided by a properly 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, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, 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. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

### § 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, and 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 and patching shall be restored to the condition existing prior to the cutting, fitting and 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 such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's 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 or 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 Owner shall be entitled to reimbursement from the Contractor.

### § 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect 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 such 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 the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.


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### § 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 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.

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

**§ 4.1.3** If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

### § 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, except as provided in Section 3.3.1.

**§ 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 report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) 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.


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**§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION**
Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

**§ 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 13.5.2 and 13.5.3, whether or not such 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, material and equipment 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, unless otherwise specifically stated by the Architect, 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 authorize 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 duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

**§ 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.


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**§ 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 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 or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply 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 previously selected if the Owner or Architect makes reasonable objection to such substitution.

### § 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, 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, which the Contractor, by these 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


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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 in writing; 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 such 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 Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

**§ 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 other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the 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, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor 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 report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that


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the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

**§ 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 the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors 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, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

### § 7.2 CHANGE ORDERS

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

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

### § 7.3 CONSTRUCTION CHANGE DIRECTIVES

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

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

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

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


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.4 As provided in Section 7.3.7.

**§ 7.3.4** If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

**§ 7.3.5** 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.

**§ 7.3.6** 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.

**§ 7.3.7** If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and 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 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.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 related to the Work; and

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

**§ 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 has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.


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## 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, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

**§ 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 an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order 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

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.

### § 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's 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. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.


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**§ 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 material 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, material suppliers, or other persons or entities making a claim by reason of having 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 issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part 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 comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. 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. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. 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 material 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;


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.3 failure of the Contractor to make payments properly to Subcontractors or 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 the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

**§ 9.5.3** 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 material or equipment suppliers 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 Architect will reflect such payment on the next Certificate 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 material and equipment 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 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, except as may otherwise be required by law.

**§ 9.6.5** Contractor payments to material and equipment 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 and 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, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

### § 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


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dispute resolution, then the Contractor may, upon seven additional days' written 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 shut-down, 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, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the 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 such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such 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 as required under Section 11.3.1.5 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.


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### § 9.10 FINAL COMPLETION AND FINAL PAYMENT

**§ 9.10.1** Upon receipt of the Contractor's written 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 and, 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 terms and conditions of 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 and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial 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 and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, 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. If such lien 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 such lien, 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 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 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; or
- **.3** terms of special warranties required by the Contract Documents.

**§ 9.10.5** Acceptance of final payment by the Contractor, a Subcontractor or material 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 or the Contractor's Subcontractors or Sub-subcontractors; and


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.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 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 owners and users of adjacent sites and utilities.

**§ 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, except damage or loss 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, written notice of such 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**

**§ 10.3.1** The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. 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 report the condition to the Owner and Architect in writing.

**§ 10.3.2** Upon receipt of the Contractor's written 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 such material or substance or who are to perform the task of removal or safe containment of such 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


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extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, 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 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 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 indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, 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 indemnify 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 LIABILITY INSURANCE

**§ 11.1.1** The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- **.1** Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- **.2** Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- **.3** Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- **.4** Claims for damages insured by usual personal injury liability coverage;
- **.5** Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- **.6** Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- **.7** Claims for bodily injury or property damage arising out of completed operations; and
- **.8** Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

**§ 11.1.2** The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the


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Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

**§ 11.1.3** Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

**§ 11.1.4** The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

**§ 11.2 OWNER'S LIABILITY INSURANCE**

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

**§ 11.3 PROPERTY INSURANCE**

**§ 11.3.1** Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

**§ 11.3.1.1** Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

**§ 11.3.1.2** If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

**§ 11.3.1.3** If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

**§ 11.3.1.4** This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.


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**§ 11.3.1.5** Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

**§ 11.3.2 BOILER AND MACHINERY INSURANCE**

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

**§ 11.3.3 LOSS OF USE INSURANCE**

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

**§ 11.3.4** If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

**§ 11.3.5** 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, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

**§ 11.3.6** Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

**§ 11.3.7 WAIVERS OF SUBROGATION**

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, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, 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 covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

**§ 11.3.8** A loss insured under the Owner's property insurance 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 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.


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**§ 11.3.9** If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

**§ 11.3.10** The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

### § 11.4 PERFORMANCE BOND AND PAYMENT BOND

**§ 11.4.1** The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

**§ 11.4.2** 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.

## 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, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

### § 12.2 CORRECTION OF WORK

#### § 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after 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 an 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 written 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


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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 2.4.

**§ 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, whether completed or partially completed, of the Owner or separate contractors 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 except that, 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 such 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 such assignment.

### § 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

### § 13.4 RIGHTS AND REMEDIES

**§ 13.4.1** 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.


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**§ 13.4.2** 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 there under, except as may be specifically agreed in writing.

### § 13.5 TESTS AND INSPECTIONS

**§ 13.5.1** 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 (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

**§ 13.5.2** 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 13.5.1, 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 13.5.3, shall be at the Owner's expense.

**§ 13.5.3** If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 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.

**§ 13.5.4** 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.

**§ 13.5.5** 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.

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

### § 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may 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.

### § 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time 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 13.7.

## 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 or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, 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;


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.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 promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

**§ 14.1.2** The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, 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' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

**§ 14.1.4** If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor 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' written 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 for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.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 above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, 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' written 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.


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### § 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 as described in 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 written 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 Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

## 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, 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.

#### § 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written 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 must 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 CONTINUING CONTRACT PERFORMANCE

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. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

#### § 15.1.4 CLAIMS FOR ADDITIONAL COST

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

#### § 15.1.5 CLAIMS FOR ADDITIONAL TIME

**§ 15.1.5.1** If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein 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.


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**§ 15.1.5.2** 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.

### § 15.1.6 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 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

### § 15.2 INITIAL DECISION

**§ 15.2.1** Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, 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 arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no 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 such 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.


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**§ 15.2.6.1** Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, 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 15.1.6 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** 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. 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** Either party, at its sole discretion, 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


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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** Either party, at its sole discretion, 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 the Owner and Contractor under this Agreement.


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# *Additions and Deletions Report for*
## *AIA® Document A201™ – 2007*

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 12:21:24 on 11/07/2016.

**PAGE 1**

PROJECT NAME
PROJECT ADDRESS
General construction services for the PROJECT NAME.

...

*(Name, legal status and address)*
OWNER NAME
OWNER ADDRESS

...

*(Name, legal status and address)*
CAS Architecture, P.C.
1485 Natchez Way
Grayson, GA 30017-2930
Telephone: 678-646-7736 E-mail: csmith@casarc.com

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# *Certification of Document's Authenticity*

*AIA® Document D401™ – 2003*

I, Chad A Smith, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 12:21:24 on 11/07/2016 under Order No. 6333509677_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2007, General Conditions of the Contract for Construction, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

*(Signed)*

_____

*(Title)*

_____

*(Dated)*

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# AIA® Document A101™ – 2007

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

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

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

OWNER NAME
OWNER ADDRESS

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

CONTRACTOR NAME
CONTRACTOR ADDRESS

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

PROJECT NAME
PROJECT ADDRESS

General Construction services for the PROJECT.

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

CAS Architecture, P.C.
1485 Natchez Way
Grayson, GA 30017-2930
Telephone: 678-646-7736 E-mail: csmith@casarc.com

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.

AIA Document A201™–2007, 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.

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TABLE OF ARTICLES

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4 CONTRACT SUM

5 PAYMENTS

6 DISPUTE RESOLUTION

7 TERMINATION OR SUSPENSION

8 MISCELLANEOUS PROVISIONS

9 ENUMERATION OF CONTRACT DOCUMENTS

10 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 the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.
*(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)*

Commencement shall begin within 14 calendars of the date of this agreement.

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

N/A

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

**§ 3.3** The Contractor shall achieve Substantial Completion of the entire Work not later than X ( X ) days from the date of commencement, or as follows:
*(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)*


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| Portion of Work | Substantial Completion Date |
|---|---|

, subject to adjustments of this Contract Time as provided in the Contract Documents.
*(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)*

Liquidated Damages in the amount of $300.00 per calendar day in accordance with Project Manual Section 00113 – Advertisement for Bids will be imposed if Substantial Completion is not achieved within the indicated days from the date of commencement.

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

**§ 4.2** The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
*(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)*

X

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

| Item | Units and Limitations | Price Per Unit ($0.00) |
|---|---|---|
| 1. Removal and disposal off site of UNSUITABLE MATERIALS. | Cubic Yard | $X |
| 2. Removal and disposal on site of UNSUITABLE MATERIALS. | Cubic Yard | $X |
| 3. Excavate, haul off site and dispose of MASS ROCK. | Cubic Yard | $X |
| 4. Excavate and burying of MASS ROCK on site. | Cubic Yard | $X |
| 5. Excavate, haul off site and dispose of TRENCH ROCK. | Per ton | $X |
| 6. Excavate and burying of TRENCH ROCK on site. | Cubic Yard | $X |
| 7. Provide SUITABLE SOIL from off site and compact in-place. | Cubic Yard | $X |
| 8. Provide SUITABLE SOIL from on site and compact in-place. | Tons | $X |
| 9. Haul in and placement of #57 stone. | Tons | $X |
| 10. Haul in and placement of surge stone (stones ranging from grapefruit size to football size). | Tons | $X |
| 11. Haul in and placement of graded aggregate base (G.A.B.) | Tons | $X |
| 12. Material and placement of geotechnical fabric. | Square Yard | $X |
| 13. Addition of structural and miscellaneous concrete. | Tons | $X |
| 14. Wood Decking. | Square Foot | $X |


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| | | |
|---|---|---|
| 15. Dewatering. | Lump sum per week | $X |

**§ 4.4** Allowances included in the Contract Sum, if any:
*(Identify allowance and state exclusions, if any, from the allowance price.)*

| Item | Price |
|---|---|
| X | |

## 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:

N/A

**§ 5.1.3** Provided that an Application for Payment is received by the Architect not later than the 1st day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the 1st day of the following month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than thirty ( 30 ) 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, unless objected to by the Architect, 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** Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

**.1** Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of ten percent ( 10 %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

**.2** Add 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), less retainage of ten percent ( 10 %);

**.3** Subtract the aggregate of previous payments made by the Owner; and

**.4** Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

**§ 5.1.7** The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

**.1** Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and


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*(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)*

**.2** Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

**§ 5.1.8** Reduction or limitation of retainage, if any, shall be as follows:
*(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)*

After fifty percent (50%) of work is completed, determined by the Architect, the retainage requirements shall be reduced to five percent (5%). However, if a dispute arises at or following fifty percent (50%) of work completed, the original retainage requirements are to be reinstated until final payment.

**§ 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 Section 12.2.2 of AIA Document A201–2007, 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:

N/A

**ARTICLE 6 DISPUTE RESOLUTION**

**§ 6.1 INITIAL DECISION MAKER**

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as 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.)*

N/A

**§ 6.2 BINDING DISPUTE RESOLUTION**

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:
*(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, 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.)*

[ **X** ] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[ ] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*


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## 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 A201–2007.

**§ 7.2** The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

## ARTICLE 8 MISCELLANEOUS PROVISIONS

**§ 8.1** Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

**§ 8.2** 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.)*

zero % 0%

**§ 8.3** The Owner's representative:
*(Name, address and other information)*

CAS Architecture, P.C.
1485 Natchez Way
Grayson, GA 30017

Point of Contact: Chad Alexander Smith, AIA, LEED AP
Telephone: 678-646-7726 E-mail: csmith@casarc.com

**§ 8.4** The Contractor's representative:
*(Name, address and other information)*

CONTRACTOR'S REPRESENTATIVE NAME
CONTRACTOR'S REPRESENTATIVE
ADDRESS

Point of Contact: NAME

Work phone: (XXX) XXX-XXXX
Email: name@emailaddress.com

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

**§ 8.6** Other provisions:

## ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

**§ 9.1** The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.


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**§ 9.1.1** The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

**§ 9.1.2** The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

**§ 9.1.3** The Supplementary and other Conditions of the Contract:

| Document | Title | Date | Pages |
|---|---|---|---|
| 002113 | A701-1997 Instructions for Bidders | | |
| 002213 | Supplementary Instructions to Bidders | | |

**§ 9.1.4** The Specifications:

*(Either list the Specifications here or refer to an exhibit attached to this Agreement.)*

The Specifications consist of sections of the Project Manual listed within Section 000110 "Table of Contents" of the separately bound Project Manual titled "Project Manual for X" dated X, and as modified by subsequent Addenda and Contract modifications.

| Section | Title | Date | Pages |
|---|---|---|---|

**§ 9.1.5** The Drawings:

*(Either list the Drawings here or refer to an exhibit attached to this Agreement.)*

The Drawings consist of the Contract Drawings and other drawings listed on the Drawing Index of page G110 of the separately bound drawing set titled "X", dated X, and as modified by subsequent Addenda and Contract modifications and as further modified to include Alternates and VE items as listed on X attached document dated X.

| Number | Title | Date |
|---|---|---|

**§ 9.1.6** The Addenda, if any:

| Number | Date | Pages |
|---|---|---|
| 1. | X | |
| 2. | X | |

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

**§ 9.1.7** Additional documents, if any, forming part of the Contract Documents:

**.1** AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

**.2** Other documents, if any, listed below:
*(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)*

A. Contractor's bid proposal, including but not limited to, form 004113 – Bid Form-Stipulated Sum (Single-Prime Contract), form 004321 – Allowance Form, form 004322 – Unit Prices Form, form 004323 – Alternate Form and the Contractor's proposal, excluding all commercial terms.
B. Value Engineering List dated X – X.


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**ARTICLE 10 INSURANCE AND BONDS**

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.

*(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)*

| Type of insurance or bond | Limit of liability or bond amount ($0.00) |
|---|---|
| 1. Bid Guarantee | Five percent (5%) of Bid |
| 2. Performance Bond | One Hundred percent (100%) of Stipulated Sum |
| 3. Labor and Material Payment Bond | One Hundred percent (100%) of Stipulated Sum |
| 4. General Liability | $1,000,000 per occurrence<br>$5,000,000 aggregate |
| 5. Automotive Liability | $1,000,000 for Any Auto |
| 6. Umbrella Liability | $10,000,000 aggregate |
| 7. Worker's Compensation & Employer Liability | $1,000,000 |
| 8. Professional Liability | $1,000,000 per claim / policy year aggregate |

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

| | |
|---|---|
| **–See attached digital signatures page–** | **–See attached digital signatures page–** |
| **OWNER** *(Signature)* | **CONTRACTOR** *(Signature)* |
| *(Printed name and title)* | *(Printed name and title)* |


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# Digital Signatures Page



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# *Additions and Deletions Report for*
## *AIA® Document A101™ – 2007*

This Additions and Deletions Report, as defined on page 1 of the associated document, reproduces below all text the author has added to the standard form AIA document in order to complete it, as well as any text the author may have added to or deleted from the original AIA text. Added text is shown underlined. Deleted text is indicated with a horizontal line through the original AIA text.

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 12:19:50 on 11/07/2016.

**PAGE 1**

**AGREEMENT** made as of the X day of X in the year X

...

OWNER NAME
OWNER ADDRESS

...

CONTRACTOR NAME
CONTRACTOR ADDRESS

...

PROJECT NAME
PROJECT ADDRESS

...

General Construction services for the PROJECT.

...

CAS Architecture, P.C.
1485 Natchez Way
Grayson, GA 30017-2930
Telephone: 678-646-7736 E-mail: csmith@casarc.com

**PAGE 2**

Commencement shall begin within 14 calendars of the date of this agreement.

...

N/A

...

**§ 3.3** The Contractor shall achieve Substantial Completion of the entire Work not later than X ( X ) days from the date of commencement, or as follows:

**PAGE 3**

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Liquidated Damages in the amount of $300.00 per calendar day in accordance with Project Manual Section 00113 – Advertisement for Bids will be imposed if Substantial Completion is not achieved within the indicated days from the date of commencement.

...

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

...

X

...

| | | |
|---|---|---|
| 1. Removal and disposal off site of UNSUITABLE MATERIALS. | Cubic Yard | $X |
| 2. Removal and disposal on site of UNSUITABLE MATERIALS. | Cubic Yard | $X |
| 3. Excavate, haul off site and dispose of MASS ROCK. | Cubic Yard | $X |
| 4. Excavate and burying of MASS ROCK on site. | Cubic Yard | $X |
| 5. Excavate, haul off site and dispose of TRENCH ROCK. | Per ton | $X |
| 6. Excavate and burying of TRENCH ROCK on site. | Cubic Yard | $X |
| 7. Provide SUITABLE SOIL from off site and compact in-place. | Cubic Yard | $X |
| 8. Provide SUITABLE SOIL from on site and compact in-place. | Tons | $X |
| 9. Haul in and placement of #57 stone. | Tons | $X |
| 10. Haul in and placement of surge stone (stones ranging from grapefruit size to football size). | Tons | $X |
| 11. Haul in and placement of graded aggregate base (G.A.B.) | Tons | $X |
| 12. Material and placement of geotechnical fabric. | Square Yard | $X |
| 13. Addition of structural and miscellaneous concrete. | Tons | $X |
| 14. Wood Decking. | Square Foot | $X |
| 15. Dewatering. | Lump sum per week | $X |

**PAGE 4**

X

...

N/A

**§ 5.1.3** Provided that an Application for Payment is received by the Architect not later than the 1st day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the 1st day of the following

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month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than thirty ( 30 ) days after the Architect receives the Application for Payment.

...

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of ten percent ( 10 %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add 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), less retainage of ten percent ( 10 %);

**PAGE 5**

After fifty percent (50%) of work is completed, determined by the Architect, the retainage requirements shall be reduced to five percent (5%). However, if a dispute arises at or following fifty percent (50%) of work completed, the original retainage requirements are to be reinstated until final payment.

...

N/A

...

N/A

...

[ X ] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

**PAGE 6**

zero % 0%

...

CAS Architecture, P.C.
1485 Natchez Way
Grayson, GA 30017

...

Point of Contact: Chad Alexander Smith, AIA, LEED AP
Telephone: 678-646-7726 E-mail: csmith@casarc.com

...

CONTRACTOR'S REPRESENTATIVE NAME
CONTRACTOR'S REPRESENTATIVE
ADDRESS

Point of Contact: NAME

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Work phone: (XXX) XXX-XXXX
Email: name@emailaddress.com

**PAGE 7**

| | |
|---|---|
| 002113 | A701-1997 Instructions for Bidders |
| 002213 | Supplementary Instructions to Bidders |

...

The Specifications consist of sections of the Project Manual listed within Section 000110 "Table of Contents" of the separately bound Project Manual titled "Project Manual for X" dated X, and as modified by subsequent Addenda and Contract modifications.

...

The Drawings consist of the Contract Drawings and other drawings listed on the Drawing Index of page G110 of the separately bound drawing set titled "X", dated X, and as modified by subsequent Addenda and Contract modifications and as further modified to include Alternates and VE items as listed on X attached document dated X.

...

| | |
|---|---|
| 1. | X |
| 2. | X |

...

A. Contractor's bid proposal, including but not limited to, form 004113 – Bid Form-Stipulated Sum (Single-Prime Contract), form 004321 – Allowance Form, form 004322 – Unit Prices Form, form 004323 – Alternate Form and the Contractor's proposal, excluding all commercial terms.
B. Value Engineering List dated X – X.

**PAGE 8**

| | |
|---|---|
| 1. Bid Guarantee | Five percent (5%) of Bid |
| 2. Performance Bond | One Hundred percent (100%) of Stipulated Sum |
| 3. Labor and Material Payment Bond | One Hundred percent (100%) of Stipulated Sum |
| 4. General Liability | $1,000,000 per occurrence<br>$5,000,000 aggregate |
| 5. Automotive Liability | $1,000,000 for Any Auto |
| 6. Umbrella Liability | $10,000,000 aggregate |
| 7. Worker's Compensation & Employer Liability | $1,000,000 |
| 8. Professional Liability | $1,000,000 per claim / policy year aggregate |

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# *Certification of Document's Authenticity*

*AIA® Document D401™ – 2003*

I, Chad A Smith, hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 12:19:50 on 11/07/2016 under Order No. 6333509677_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A101™ – 2007, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

_____

*(Signed)*

_____

*(Title)*

_____

*(Dated)*

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# AIA® Document G715™ – 1991

## *Supplemental Attachment* for ACORD Certificate of Insurance 25-S

**PROJECT** *(Name and address)*:
PROJECT NAME
PROJECT ADDRESS

**INSURED** _____

| | | Yes | No | N/A |
|---|---|---|---|---|
| **A.** | **General Liability** | | | |
| **1.** | Does the General Aggregate apply to this Project only? | ☐ | ☐ | ☐ |
| **2.** | Does this policy include coverage for: | | | |
| a. | Premises - Operations? | ☐ | ☐ | ☐ |
| b. | Explosion, Collapse and Underground Hazards? | ☐ | ☐ | ☐ |
| c. | Personal Injury Coverage? | ☐ | ☐ | ☐ |
| d. | Products Coverage? | ☐ | ☐ | ☐ |
| e. | Completed Operations? | ☐ | ☐ | ☐ |
| f. | Contractual Coverage for the Insured's obligations in A201? | ☐ | ☐ | ☐ |
| **3.** | If coverage is written on a claims-made basis, what is the: | | | |
| a. | Retroactive Date? | | | |
| b. | Extended Reporting Date? | | | |
| **B.** | **Worker's Compensation** | | | |
| **1.** | If the Insured is exempt from Worker's Compensation statutes, does the Insured carry the equivalent Voluntary Compensation coverage? | ☐ | ☐ | ☐ |
| **C.** | **Final Payment Information** | | | |
| **1.** | Is this certificate being furnished in connection with the Contractor's request for final payment in accordance with the requirements of Sections 9.10.2 and 11.1.3 of AIA Document A201, General Conditions of the Contract for Construction? | ☐ | ☐ | ☐ |
| **2.** | If so, and if the policy period extends beyond termination of the Contract for Construction, is Completed Operations coverage for this Project continued for the balance of the policy period? | ☐ | ☐ | ☐ |
| **D.** | **Termination Provisions** | | | |
| **1.** | Has each policy shown on the certificate and this Supplement been endorsed to provide the holder with 30 days notice of cancellation and/or expiration? List below any policies which do not contain this notice. | ☐ | ☐ | ☐ |
| **E.** | **Other Provisions** | | | |

_____
Authorized Representative

_____
Date of Issue

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**User Notes:** (812857190)

# SECTION 011000 - SUMMARY

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Work restrictions.
5. Specification and drawing conventions.

### 1.2 PROJECT INFORMATION

A. Project Identification: **COLLINS P. LEE MEMORIAL LIBRARY**

1. Project Location: **237 Harrisburg RD SW, Milledgeville, GA 31061**

B. Owner: **Middle Georgia Regional Library System**

1. Owner's Representatives:
   **Jennifer Lautzenheiser, Director**
   **Middle Georgia Regional Library System**

C. Architect (Architect of Record): Cas Architecture, P.C.

1. Architect Representative: Chad Alexander Smith, AIA, RID, LEED AP.

D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents: **Refer to Drawing G110 Project Directory and Contacts for complete list of consultants.**

E. Contractor: TBD

### 1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project: **The Project consists of the renovation of 3,426 of the existing Collins P. Lee Community Service Center to create the new Collins P. Lee Memorial Library. Scope includes interior reconfiguration, building system upgrades and site improvements.**

B. Type of Contract: Single Prime Lump Sum.

1.4 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.5 ACCESS TO SITE

A. General: Contractors shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving adjacent facilities occupied by others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.

C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other inordinate disruption to adjacent properties

D. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted. Contractor may assign designated smoking areas for employee use. Designated smoking areas must be maintained by the contractor.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

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

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

# SECTION 012100 - ALLOWANCES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Unit-cost allowances.

C. Related Requirements:

1. Section 012200 "Unit Prices" for procedures for using unit prices.
2. Section 014000 "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.

### 1.2 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

### 1.3 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

### 1.4 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

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

1.6 LUMP-SUM AND UNIT-COST ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.

B. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.7 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

**A. A schedule of Allowances are included in SECTION 004321 – ALLOWANCE FORM. Refer to SECTION 012123 – CONTINGENCY ALLOWANCE for Contingency allowance.**

END OF SECTION 012100

# SECTION 012123 – CONTINGENCY ALLOWANCE

## PART 1 - GENERAL

### 1.1 REQUIREMENTS INCLUDED

A. Monetary amount of Contingency Allowance in Contract Sum.

B. Disbursement of funds from Contingency Allowance.

### 1.2 RELATED REQUIREMENTS

A. Section 004113 – Bid Form: The undersigned proposes to furnish all services, labor, and materials required by them for the entire work and to include a contingency amount of **$100,000.00** within the Stipulated Sum Base Bid in accord with said documents.

B. Section 006357 – AIA Document G701-2001, "Change Order": Contractor and subcontractor percentages of overhead and profit for Change Orders.

### 1.3 ALLOWANCE

A. Allow the lump sum of **$100,000.00** for disbursal at Owner's instructions.

B. Contractor's costs for products, labor, insurance, payroll taxes, bond, transportation, equipment rental, and overhead and profit will be included in Change Orders authorizing expenditure of funds from this allowance.

### 1.4 USE OF ALLOWANCE

A. Funds will be drawn from Contingency Allowance only by Change Order.

B. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

## PART 2 – PRODUCTS

Not Used.

## PART 3 – EXECUTION

Not Used.

END OF SECTION 012123

# SECTION 012200 - UNIT PRICES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:

1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

### 1.2 DEFINITIONS

A. Unit price is a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

### 1.3 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in **SECTION 004322 – UNIT PRICES FORM.** Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION (Not Used)

END OF SECTION 012200

# SECTION 012300 - ALTERNATES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

### 1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

### 1.3 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included in **SECTION 004323 – ALTERNATES FORM**. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION (Not Used)

END OF SECTION 012300

# SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

## PART 1 - GENERAL

### 1.1 SUMMARY

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

### 1.2 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions" or other Architect authorized forms.

### 1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    e. Quotation Form: Use forms acceptable to the Architect and Owner as outlined in the agreement between Owner and Contractor.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

1.4 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: Refer to Contract Conditions (Agreement between Owner and Contractor) for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances, and accepted alternates.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect or Owner will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction or Work Change Directive: Architect and Owner may issue a Work Change Directive on AIA Document G714. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

# SECTION 012900 - PAYMENT PROCEDURES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:
   1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
   2. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

### 1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

   1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

      a. Application for Payment forms with continuation sheets.
      b. Submittal schedule.
      c. Items required to be indicated as separate activities in Contractor's construction schedule.

   2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

   1. Identification: Include the following Project identification on the schedule of values:

      a. Project name and location.
      b. Name of Architect.
      c. Architect's project number.
      d. Contractor's name and address.
      e. Date of submittal.

   2. Arrange schedule of values consistent with format of AIA Document G703.
   3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports.

Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment. .

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

    1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
    2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

    1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Schedule of unit prices.
5. Submittal schedule (preliminary if not final).
6. List of Contractor's staff assignments.
7. List of Contractor's principal consultants.
8. Copies of building permits.
9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
10. Initial progress report.
11. Report of preconstruction conference.
12. Certificates of insurance and insurance policies.

H. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707-1994, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.

8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

# SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination drawings.
2. Requests for Information (RFIs).
3. Project meetings.

B. Related Requirements:

1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

### 1.2 DEFINITIONS

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

### 1.3 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

### 1.4 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.

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

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

1.5 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.

c. Requests for coordination information already indicated in the Contract Documents.
d. Requests for adjustments in the Contract Time or the Contract Sum.
e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly with the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

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

## 1.6 PROJECT MEETINGS

A. General: Contractor will schedule and conduct meetings and conferences at Project Site unless otherwise indicated. Provide virtual meeting capabilities as well, to accommodate attendees who are not present at the Project Site.

1. Attendees: Contractor will inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Contractor will prepare the meeting agenda. Distribute the agenda to all invited attendees via e-mail prior to the project meeting.
3. Minutes: Contractor will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

**4. Technology: Contractor will provide in jobsite trailer (or whatever location of meetings held) a television monitor and technology with capabilities to hold virtual meetings.**

B. Preconstruction Conference: Contractor will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 20 days after execution of the Agreement.

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

   **a. Site Work**
   **b. Concrete**
   **c. Architectural Millwork**
   **d. HVAC Systems**
   **e. Roof System**
   **f. Low Voltage Systems and Communications**

2. Agenda: Contractor will prepare the meeting agenda to discuss items of significance that could affect progress, including the following:

   a. Tentative construction schedule.
   b. Phasing.
   c. Critical work sequencing and long-lead items.
   d. Designation of key personnel and their duties.
   e. Procedures for processing field decisions and Change Orders.
   f. Procedures for RFIs.
   g. Procedures for testing and inspecting.
   h. Procedures for processing Applications for Payment.
   i. Distribution of the Contract Documents.
   j. Submittal procedures.
   k. Preparation of record documents.
   l. Use of the premises.
   m. Work restrictions.
   n. Working hours.
   o. Owner's occupancy requirements.
   p. Responsibility for temporary facilities and controls.
   q. Procedures for moisture and mold control.
   r. Procedures for disruptions and shutdowns.
   s. Construction waste management and recycling.
   t. Parking availability.
   u. Office, work, and storage areas.
   v. Equipment deliveries and priorities.
   w. First aid.
   x. Security.
   y. Progress cleaning.

3. Minutes: Contractor will record and distribute meeting minutes via e-mail.

C. Preinstallation Conferences: Contractor will conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, and Owner's Commissioning Authority of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.
    e. Purchases.
    f. Deliveries.
    g. Submittals.
    h. Review of mockups.
    i. Possible conflicts.
    j. Compatibility problems.
    k. Time schedules.
    l. Weather limitations.
    m. Manufacturer's written instructions.
    n. Warranty requirements.
    o. Compatibility of materials.
    p. Acceptability of substrates.
    q. Temporary facilities and controls.
    r. Space and access limitations.
    s. Regulations of authorities having jurisdiction.
    t. Testing and inspecting requirements.
    u. Installation procedures.
    v. Coordination with other work.
    w. Required performance results.
    x. Protection of adjacent work.
    y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at bi-monthly intervals.

1. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority, and Architect, each contractor, subcontractor, supplier, and other

entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

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

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

        1) Review schedule for next period.

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

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

3. Minutes: Contractor will record and distribute the meeting minutes to each party present and to parties requiring information via e-mail.

    a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

# SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.
2. Construction schedule updating reports.
3. Daily construction reports.
4. Site condition reports.

B. Related Requirements:

1. Section 011200 "Multiple Contract Summary" for preparing a combined Contractor's construction schedule.

### 1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Float: The measure of leeway in starting and completing an activity.

### 1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.

B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

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

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

1.4 COORDINATION

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

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

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

1. Activity Duration: Define activities so no activity is longer than **twenty (20)** days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than **thirty (30)** days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than **fifteen (15)** days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than **thirty (30)** days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
4. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use of premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

5. Work Stages: Indicate important stages of construction for each major portion of the Work.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.

2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

F. Recovery Schedule: When periodic update indicates the Work is **fourteen (14)** or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule.

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

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within **fourteen (14)** days of date established from the **Notice of Award**.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events.
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit

with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

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

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

END OF SECTION 013200

# SECTION 013300 - SUBMITTAL PROCEDURES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:
   1. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
   2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
   3. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

### 1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

### 1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

### 1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

   1. 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.

      a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

b. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittal, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

a. Project name.
b. Date.
c. Name of Architect.
d. Name of Contractor.
e. Name of subcontractor.
f. Name of supplier.
g. Name of manufacturer.
h. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

i. Number and title of appropriate Specification Section.

j. Drawing number and detail references, as appropriate.
k. Location(s) where product is to be installed, as appropriate.
l. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

   a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

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

   a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

   a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software acceptable to Owner, containing the following information:

   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name of Contractor.
   e. Name of firm or entity that prepared submittal.
   f. Names of subcontractor, manufacturer, and supplier.
   g. Category and type of submittal.
   h. Submittal purpose and description.
   i. Specification Section number and title.
   j. Specification paragraph number or drawing designation and generic name for each of multiple items.
   k. Drawing number and detail references, as appropriate.

l. Location(s) where product is to be installed, as appropriate.
m. Related physical samples submitted directly.
n. Indication of full or partial submittal.
o. Transmittal number, numbered consecutively.
p. Submittal and transmittal distribution record.
q. Other necessary identification.
r. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

a. Project name.
b. Number and title of appropriate Specification Section.
c. Manufacturer name.
d. Product name.

F. Options: Identify options requiring selection by Architect.

G. Deviations: Identify deviations from the Contract Documents on submittals.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

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

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Submit electronic submittals via email as PDF electronic files.

a. Architect, through will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
3. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.

4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

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

    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

    a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data [unless submittal based on Architect's digital data drawing files is otherwise permitted].

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.

c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

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

a. PDF electronic file.

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

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in

manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Submit product schedule in the following format:

a. PDF electronic file.

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

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

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

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

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

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

L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

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

N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

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

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

R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

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

T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

U. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."

V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

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

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

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

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

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

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

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

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

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

Reference: Electronic File Release Form to Contractor

*Dear General Contractor:*

At your request, CAS Architecture, P.C. will provide electronic files for your convenience and use in the preparation of shop drawings related to the referenced project, subject to the following terms and conditions:

Our electronic files are compatible with: **Revit and/or AutoCAD**. We make no representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced specifications.

Data contained on these electronic files are part of our instruments of service and shall not be used by you or anyone else receiving these data through or from you for any purpose other than as a convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by you or by others will be at your sole risk and without liability or legal exposure to us. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against us, our officers, directors, employees, agents or sub-consultants that may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold us harmless against all damages, liabilities or costs, include reasonable attorneys' fees and defense costs, arising out of or resulting from your use of these electronic files.

These electronic files are not construction documents. Differences may exist between these electronic files and corresponding hard-copy construction documents. We make no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed or sealed hard-copy construction documents prepared by us and the electronic files, the signed and sealed hard-copy construction documents shall govern. You are responsible for determining if any conflict exists by your use of these electronic files, you are not relieved of your duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate your work with that of other contractors for the project.

Because information presented on the electronic files can be modified, unintentionally or otherwise, we reserve the right to remove all indicia of ownership and /or involvement from each electronic display.

Under no circumstances shall delivery of the electronic files for use by you be deemed a sale by us, and we make no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall we be liable for any loss of project or any consequential damages as a result of your use or reuse of these electronic files.

All terms and conditions above are hereby agreed and accepted in their entirety as a condition of receipt of the electronic file.

*(Contractor name and address)*

_____

_____

_____

*Signature / Title* _____

*Date* _____

END OF SECTION 013300.1

# SECTION 014000 - QUALITY REQUIREMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
3. Specific test and inspection requirements are not specified in this Section.

### 1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

## 1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

## 1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

## 1.5 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.

6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those

performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

## 1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

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

E. Testing Agency Responsibilities: Cooperate with Architect, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

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

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
6. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

## 1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections.

# PART 2 - PRODUCTS (Not Used)

# PART 3 - EXECUTION

## 3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and Construction Manager's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

# SECTION 014200 - REFERENCES

## PART 1 - GENERAL

### 1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

### 1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
10. AF&PA - American Forest & Paper Association; www.afandpa.org.
11. AGA - American Gas Association; www.aga.org.
12. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
14. AI - Asphalt Institute; www.asphaltinstitute.org.
15. AIA - American Institute of Architects (The); www.aia.org.
16. AISC - American Institute of Steel Construction; www.aisc.org.
17. AISI - American Iron and Steel Institute; www.steel.org.
18. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
19. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
20. ANSI - American National Standards Institute; www.ansi.org.
21. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
22. APA - APA - The Engineered Wood Association; www.apawood.org.
23. APA - Architectural Precast Association; www.archprecast.org.
24. API - American Petroleum Institute; www.api.org.
25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
26. ARI - American Refrigeration Institute; (See AHRI).
27. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
28. ASCE - American Society of Civil Engineers; www.asce.org.
29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
30. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.

31. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
32. ASSE - American Society of Safety Engineers (The); www.asse.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
35. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
36. AWEA - American Wind Energy Association; www.awea.org.
37. AWI - Architectural Woodwork Institute; www.awinet.org.
38. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
39. AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
40. AWS - American Welding Society; www.aws.org.
41. AWWA - American Water Works Association; www.awwa.org.
42. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
43. BIA - Brick Industry Association (The); www.gobrick.com.
44. BICSI - BICSI, Inc.; www.bicsi.org.
45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
46. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
47. BOCA - BOCA; (Building Officials and Code Administrators International Inc.); (See ICC).
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwfbadminton.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CPA - Composite Panel Association; www.pbmdf.com.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csinet.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; www.ec-central.org.

72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
73. EIA - Electronic Industries Alliance; (See TIA).
74. EIMA - EIFS Industry Members Association; www.eima.com.
75. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
76. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
77. ESTA - Entertainment Services and Technology Association; (See PLASA).
78. EVO - Efficiency Valuation Organization; www.evo-world.org.
79. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
80. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
81. FM Approvals - FM Approvals LLC; www.fmglobal.com.
82. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
83. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridaroof.com.
84. FSA - Fluid Sealing Association; www.fluidsealing.com.
85. FSC - Forest Stewardship Council U.S.; www.fscus.org.
86. GA - Gypsum Association; www.gypsum.org.
87. GANA - Glass Association of North America; www.glasswebsite.com.
88. GS - Green Seal; www.greenseal.org.
89. HI - Hydraulic Institute; www.pumps.org.
90. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
92. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
93. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
94. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
95. IAS - International Approval Services; (See CSA).
96. ICBO - International Conference of Building Officials; (See ICC).
97. ICC - International Code Council; www.iccsafe.org.
98. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
99. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
100. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
101. IEC - International Electrotechnical Commission; www.iec.ch.
102. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
103. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
104. IESNA - Illuminating Engineering Society of North America; (See IES).
105. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
106. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
107. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
108. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
109. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
110. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
111. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
112. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
113. ISO - International Organization for Standardization; www.iso.org.

114. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
115. ITU - International Telecommunication Union; www.itu.int/home.
116. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
117. LMA - Laminating Materials Association; (See CPA).
118. LPI - Lightning Protection Institute; www.lightning.org.
119. MBMA - Metal Building Manufacturers Association; www.mbma.com.
120. MCA - Metal Construction Association; www.metalconstruction.org.
121. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
122. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
123. MHIA - Material Handling Industry of America; www.mhia.org.
124. MIA - Marble Institute of America; www.marble-institute.com.
125. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
126. MPI - Master Painters Institute; www.paintinfo.com.
127. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
128. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
129. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
130. NADCA - National Air Duct Cleaners Association; www.nadca.com.
131. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
132. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
133. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
134. NCMA - National Concrete Masonry Association; www.ncma.org.
135. NEBB - National Environmental Balancing Bureau; www.nebb.org.
136. NECA - National Electrical Contractors Association; www.necanet.org.
137. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
138. NEMA - National Electrical Manufacturers Association; www.nema.org.
139. NETA - InterNational Electrical Testing Association; www.netaworld.org.
140. NFHS - National Federation of State High School Associations; www.nfhs.org.
141. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
142. NFPA - NFPA International; (See NFPA).
143. NFRC - National Fenestration Rating Council; www.nfrc.org.
144. NHLA - National Hardwood Lumber Association; www.nhla.com.
145. NLGA - National Lumber Grades Authority; www.nlga.org.
146. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
147. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
148. NRCA - National Roofing Contractors Association; www.nrca.net.
149. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
150. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
151. NSPE - National Society of Professional Engineers; www.nspe.org.
152. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
153. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
154. NWFA - National Wood Flooring Association; www.nwfa.org.
155. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
156. PDI - Plumbing & Drainage Institute; www.pdionline.org.
157. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.

158. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
159. RFCI - Resilient Floor Covering Institute; www.rfci.com.
160. RIS - Redwood Inspection Service; www.redwoodinspection.com.
161. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
162. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
163. SDI - Steel Deck Institute; www.sdi.org.
164. SDI - Steel Door Institute; www.steeldoor.org.
165. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
166. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
167. SIA - Security Industry Association; www.siaonline.org.
168. SJI - Steel Joist Institute; www.steeljoist.org.
169. SMA - Screen Manufacturers Association; www.smainfo.org.
170. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
171. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
172. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
173. SPIB - Southern Pine Inspection Bureau; www.spib.org.
174. SPRI - Single Ply Roofing Industry; www.spri.org.
175. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
176. SSINA - Specialty Steel Industry of North America; www.ssina.com.
177. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
178. STI - Steel Tank Institute; www.steeltank.com.
179. SWI - Steel Window Institute; www.steelwindows.com.
180. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
181. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
182. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
183. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
184. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
185. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
186. TMS - The Masonry Society; www.masonrysociety.org.
187. TPI - Truss Plate Institute; www.tpinst.org.
188. TPI - Turfgrass Producers International; www.turfgrasssod.org.
189. TRI - Tile Roofing Institute; www.tileroofing.org.
190. UBC - Uniform Building Code; (See ICC).
191. UL - Underwriters Laboratories Inc.; www.ul.com.
192. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
193. USAV - USA Volleyball; www.usavolleyball.org.
194. USGBC - U.S. Green Building Council; www.usgbc.org.
195. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
196. WASTEC - Waste Equipment Technology Association; www.wastec.org.
197. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
198. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
199. WDMA - Window & Door Manufacturers Association; www.wdma.com.
200. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
201. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
202. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.

203. WPA - Western Wood Products Association; www.wwpa.org.

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; http://dodssp.daps.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; http://eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeia; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

# SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

### 1.2 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

### 1.3 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

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

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

### 1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch 0.148-inch thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch OD corner and pull posts, with 1-5/8-inch OD top rails.

2.2 TEMPORARY FACILITIES

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

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel.

1. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Contractor's emergency after-hours telephone number.
e. Architect's office.
f. Engineers' offices.
g. Owner's office.
h. Principal subcontractors' field and home offices.

2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

J. Electronic Communication Service: Provide a desktop computer (or equivalent) in the primary field office adequate for use by Architect and Owner to access project electronic documents and maintain electronic communications. Equip computer with software compatible with the Architects:

## 3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Provide temporary parking areas for construction personnel.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.

2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
3. Maintain and touchup signs so they are legible at all times.

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

H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

## 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

E. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

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

G. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

I. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

## 3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Discard or replace water-damaged and wet material.
4. Discard, replace, or clean stored or installed material that begins to grow mold.
5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

## 3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent

construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

# SECTION 016000 - PRODUCT REQUIREMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for requests for substitutions.

### 1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

### 1.3 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of

proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:
1. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
2. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
3. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
    b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
    b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.2 COMPARABLE PRODUCTS

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

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

# SECTION 017300 - EXECUTION

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

### 1.2 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Certified Surveys: Submit two copies signed by land surveyor.

D. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

### 1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

## 3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

D. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

## 3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

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

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

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

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

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

## 3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

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

C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements

retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.

G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

## 3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

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

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

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

## 3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements"

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

# SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Disposing of nonhazardous construction waste.

### 1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

C. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

### 1.3 PERFORMANCE REQUIREMENTS

A. General: Recycle construction waste as per best practices standards and requirements of local authorities or as directed by Owner.

### 1.4 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Provide for waste disposal in accordance with state and local rules and regulation as well as any owner specified requirements. Provide training of work forces to implement plan.

## PART 2 - EXECUTION

### 2.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

2.2 RECYCLING CONSTRUCTION WASTE, GENERAL

A. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

2.3 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 017419

# SECTION 017700 - CLOSEOUT PROCEDURES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

### 1.2 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

### 1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

### 1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

### 1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section.

5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items,

either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Submit list of incomplete items in the following format:

    a. MS Excel electronic file. Architect will return annotated copy.
    b. PDF electronic file. Architect will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    e. Remove snow and ice to provide safe access to building.
    f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    h. Sweep concrete floors broom clean in unoccupied spaces.
    i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
    j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
    k. Remove labels that are not permanent.
    l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
    p. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

## 3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

# SECTION 017823 - OPERATION AND MAINTENANCE DATA

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

### 1.2 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

    a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

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

D. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.

6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.

4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation,

maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.

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

END OF SECTION 017823

# SECTION 017839 - PROJECT RECORD DOCUMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

### 1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
1. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal:
1) Submit PDF electronic files of scanned record prints and one paper copy set(s) of file prints.
2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:
1) Submit PDF electronic files of scanned record prints and three set(s) of prints.
2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Record data as soon as possible after obtaining it.
    c. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Annotated PDF electronic file with comment function enabled.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.
4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

    a. Project name.

b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Note related Change Orders, record Product Data, and record Drawings where applicable.

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

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

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

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as scanned PDF electronic file(s) of marked-up miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

# SECTION 017900 - DEMONSTRATION AND TRAINING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

### 1.2 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

### 1.3 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals.

### 1.4 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

B. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system (as indicated) including:

1. Basis of System Design, Operational Requirements, and Criteria.
2. Documentation.
3. Emergencies.
4. Operations.
5. Adjustments and Troubleshooting.
6. Maintenance and Repairs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

3.2 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

END OF SECTION 017900

# SECTION 029000 - PLANTING

## PART 1 - GENERAL

### 1.1 SUMMARY

### 1.2 Section Includes

1. Preparation and excavation of planting beds.
2. Planting of trees, shrubs, sod, seed, and associated materials.

### 1.3 REFERENCES

A. American National Standards Institute (ANSI)
   1. ANSI Z60.1 - American Standard for Nursery Stock

B. American Sod Producer Association (ASPA)

C. American Nursery and Landscape Association (ANLA)

### 1.4 SUBMITTALS

A. Before ordering or purchasing materials, provide samples upon request.

B. Submit certification tags from trees, shrubs, sod, and seed verifying type and purity.

C. Unless otherwise authorized by Owner, notify Owner or Landscape Architect at least 48 hours in advance of anticipated delivery date of plant materials. Legible copy of invoice, showing kinds and sizes of materials included for each shipment, shall be furnished to Owner.

D. Inform Owner of date when planting shall commence.

E. As installation occurs, prepare accurate record drawings. Submit one full size copy prior to final inspection. Drawing shall include detail and dimension changes made during construction.

### 1.5 QUALITY ASSURANCE

A. Condition of new plant materials is responsibility of Contractor and shall be approved by Owner or Landscape Architect. Owner or Landscape Architect reserves right to inspect and reject plants at any time and place.

B. Measure plants when branches are in their normal position.

C. Trees and shrubs shall meet requirements for spread, height, or container size stated in The Drawings.
   1. Measurements shall be taken from ground level to average height of shrub and not to longest branch.
   2. Height and spread dimensions specified herein refer to main body of trees measured from crown of roots to tip of top branch.

D. Caliper measurements shall be taken at point on tree trunk 6 inches above natural ground line for trees up to 4 inches in caliper, and at point 12 inches above natural ground line for trees exceeding 4 inches in caliper.

E. If range of sizes is given, no plant shall be less than minimum size, and at least 50 percent of plants shall be as large as upper half of range specified.

F. Measurements specified are minimum size acceptable and, where pruning is required, are measurements after pruning.

1.6 PROJECT CONDITIONS

A. Work shall be performed only during weather conditions favorable to landscape construction and to health and welfare of plants. Owner or Landscape Architect shall determine suitability of such weather conditions.

1.7 MAINTENANCE SERVICE (Optional services to be approved by Owner)

A. Provide Owner with 3 written proposals prior to possession date for landscape maintenance from experienced local nursery businesses capable of performing work specified herein. Accepted proposal and maintenance contract will be for period of 1 year and renewable in 1- year increments. Maintenance will begin immediately after final acceptance of landscaping by Owner. During the first-year warranty period, the Contractor shall be responsible for ensuring that the maintenance contract is being followed. Proposals shall be submitted for work as specified in paragraph "Maintenance After Construction" in Part 3 hereinafter.

PART 2 - PRODUCTS

2.1 PLANT MATERIALS

A. Plant material (trees and shrubs) shall conform to requirements of ANSI Z60.1 of rules and grading upgraded to meet the following:
   1. Plants shall be of selected specimen quality, exceptionally heavy, symmetrical, tightly knit, so trained or favored in their development and appearance as to be superior in form, number of branches, compactness and symmetry. Plants shall have normal habit or sound, healthy, vigorous plants with well-developed root system.
   2. Plants shall be free of disease, insect pests, eggs, or larvae.
   3. Plants shall not be pruned before delivery.
   4. Trees with abrasion of bark, sunscalds, disfiguring knots, or fresh cuts of limbs over 1 1/4-inch, which have not completely calloused, shall be rejected.
   5. Plants shall be typical of their species or variety and shall have normal habit of growth and be legibly tagged with proper name. Plants shall have been grown under climatic conditions similar to those of site or have been acclimated to such condition for at least 2 years.
   6. Root system of each plant shall be well-provided with fibrous roots. Parts shall be sound, healthy, vigorous, well-branched, and densely foliated when in leaf.
   7. Plants designated ball and burlap shall be moved with root systems as solid units with balls of earth firmly wrapped with burlap and comply with the following:
      a. Diameter and depth of balls of earth shall be sufficient to encompass fibrous root feeding systems necessary for healthy development of plant.

b. No plant shall be accepted when ball of earth surrounding its roots has been badly cracked or broken preparatory to or during process of planting. Balls shall remain intact during all operations.
c. Plants that cannot be planted at once shall be heeled-in by setting in ground and covering balls with soil or mulch and then watering.
d. Hemp burlap and twine is preferable to treated. If treated burlap is used, twine shall be cut from around trunk and burlap shall be removed.

8. Trunk of each tree shall be single trunk growing from single unmutilated crown of roots. No part of trunk shall be conspicuously crooked as compared with normal trees of same variety.
9. Thickness of each shrub shall correspond to trade classification "No.1". Single-stemmed or thin plants shall not be accepted. Side branches shall be generous, well-twigged, and plant as whole well-branched to ground. Plants shall be in moist condition, free from dead wood, bruises, or other root or branch injuries.

2.2 LAWN SEED

A. Lawn seed mixture shall be fresh, clean new crop seed. Furnish to Owner or Landscape Architect dealers guaranteed statement of composition of mixture and percentage of purity and germination of each variety.

B. Seed Mixture: Provide seed of grass species and varieties, proportions by weight and minimum percentages of purity, germination, and maximum percentage of weed seed. Seed mixtures vary by region and season and shall comply with State DOT and Local Soil Conservation Ser- vice Standards for lawn turf.

2.3 SOD

A. Sod shall be ASPA certified, species suitable as lawn turf for the region. Sod shall be strongly rooted, weed, disease, pest free and uniform in thickness.

2.4 TOPSOIL

A. Natural, friable, fertile, fine loamy soil possessing characteristics of representative topsoil in the vicinity that produces heavy growth. Topsoil shall have a pH range of 5.5 to 7.4 percent, free from subsoil, objectionable weeds, litter, sods, stiff clay, stones larger than 1-inch in diameter, stumps, roots, trash, toxic substances, or any other material which may be harmful to plant growth or hinder planting operations.

B. Verify amount stockpiled if any, and supply additional as needed from naturally well-drained sites where topsoil occurs at least 4 inches deep. Do not obtain topsoil from bogs or marshes.

2.5 FERTILIZER

A. Deliver fertilizer, mixed as specified, in original unopened standard size bags showing weight, analysis and name of manufacturer. Containers shall bear manufacturer's guaranteed statement of analysis, or manufacturer's certificate of compliance covering analysis shall be furnished to Owner or Landscape Architect. Store fertilizer in such manner that it shall be kept dry.

B. Base percentages of nitrogen, phosphorus, and potash on laboratory test recommendations as approved by Owner or Landscape Architect. For bidding assume 10 percent nitrogen, 6 percent phosphorus, and 4 percent potash by weight. At least 50 percent of total nitrogen

shall contain no less than 3 percent water-insoluble nitrogen. At least 60 percent of nitrogen content shall be derived from super-phosphate containing not less than 18 percent phosphoric acid or bone meal containing 25 - 30 percent phosphoric acid and 2 - 3 percent nitrogen. Potash shall be derived from muriate of potash containing 55 - 60 percent potash.

2.6 PEAT MOSS

A. Peat moss shall be Michigan peat moss or approved equal in color and consistency.

B. Peat moss shall be moss peat, finely shredded to pass 1/2-inch mesh and shall be no less than 90 percent organic material by weight, with ash content by ignition of no more than 10 per- cent.

C. Material shall contain 35 - 66 percent moisture by weight, but shall have water-holding capacity of 150 - 200 percent.

D. Material shall have pH value of 4 to 5.

E. Material may be imported supplied in bales or domestic furnished in bulk. If furnished in bulk, material and its source shall be acceptable to Owner or Landscape Architect.

2.7 SHREDDED HARDWOOD BARK MULCH

A. Mulch shall be of sufficient character as not to be easily displaced by wind or water runoff.

2.8 STAKING MATERIAL

A. Stakes shall be #3 rebar, 4 ft long. Three stakes shall be used for each tree.

B. Arbor Tie may be used for staking trees. Follow manufacturer's instructions for tying and staking Arbor Tie material. If wire is used for tree staking, it shall be pliable No. 12 galvanized soft steel wire.

C. Hose shall be 2-ply fibred-bearing rubber garden hose, not less than 1/2-inch inside diameter, black or green, and of suitable length.

2.9 WATER

A. Potable water shall be furnished by the Contractor. Contractor shall furnish hose and other watering equipment.

2.10 WEED MAT

A. Weed mat shall be 4.1 oz., woven polypropylene, needle-punched fabric, Weed Barrier by Dewitt Company, Sikeston, MO, (800) 888-9669.

2.11 STEEL EDGING

A. Steel edging shall be 1/8-inch x 4-inch interlocking steel edge, staked with metal stakes sufficiently to hold in place.

2.12 EROSION CONTROL BLANKET

A. Blankets, biodegradable, enclosed in a photodegradable plastic mesh, including steel wire staples, 6 inches long. Curlex blankets by American Excelsior Company, or Polyjute Style 465 GT by Synthetic Industries.

PART 3 - EXECUTION

3.1 PREPARATION

A. If project completion date prohibits in-season planting, prepare for out-of-season seeding or sodding so that lawns shall be completed and ready for acceptance at time of project completion.

B. Locations containing unsuitable subsoil shall be treated by one or more of the following:
   1. Where unsuitability is deemed by Owner or Landscape Architect to be due to excessive compaction caused by heavy equipment and where natural subsoil is other than AASHTO classification of A6 or A7, loosen such areas with spikes, discing, or other means to loosen soil to condition acceptable to Owner or Landscape Architect. Loosen soil to minimum depth of 12 inches with additional loosening as required to obtain adequate drainage. Contractor may introduce peat moss, sand, or organic matter into the subsoil to obtain adequate drainage. Such remedial measures shall be considered as incidental, without additional cost to Owner.
   2. Where unsuitability is deemed by Owner or Landscape Architect to be due to presence of boards, mortar, concrete, or other construction materials in sub-grade and where natural subsoil is other than AASHTO classification of A6 or A7, remove debris and objectionable material. Such remedial measures shall be considered as incidental, without additional cost to Owner.
   3. Where unsuitability is deemed by Owner or Landscape Architect to be because natural subsoil falls into AASHTO classification of A6 or A7 and contains moisture in excess of 30 percent, then installation of sub-drainage system or other means described elsewhere in Specifications shall be used. Where such conditions have not been known or revealed prior to planting time and they have not been recognized in preparation of The Drawings and Specifications, then Contractor shall issue cost proposal to install proper remedial measures.

C. Perform planting operations at steady rate of work unless weather conditions make it impossible to work. No plant material shall be planted in frozen ground.

D. Disk, drag, harrow, or hand rake subgrade to depth of 4 inches and removed stones larger than 1-1/2 inches to provide bond for topsoil. Topsoil, which must be transported across finished sidewalks, shall be delivered in such manner that no damage will be done to sidewalks.

E. Do not place topsoil until subgrade has been approved by Owner or Landscape Architect. Before placing topsoil, rake subsoil surface clear of stones, debris, and roots. Compact topsoil to form layer with minimum depth of 4 inches in lawn areas and 12 inches in shrub beds. Place topsoil so that after final settlement there will be positive drainage conforming to elevations shown on the Drawings.

F. Tree and Shrub Preparation
   1. Dig bare-rooted shrubs with adequate fibrous roots. Cover roots with uniformly thick coating of mud by being puddled immediately after they are dug, or packed in moist straw or moss.
   2. Dig ball and burlap plants with firm natural balls of earth of diameter and depth to include fibrous roots.
   3. Protect roots or balls of plants at all times from sun and drying winds.
   4. Ball and burlap plants which cannot be planted immediately upon delivery shall be set on ground and protected with soil, wet moss, or other acceptable material. Heel-in bare rooted plants that cannot be planted immediately upon delivery. All shall be kept moist.
   5. Open and separate bundles of plants before roots are covered. Prevent air pockets among roots. During planting operations, cover bare roots with canvas, hay, or other suitable material. Plants shall not be bound with wire or rope which will result in damage to bark or branches.

G. Seed Bed Preparation
   1. Grade areas to finish grades, filling as needed or removing surplus dirt. Float areas to smooth, uniform grade as indicated on the Drawings. Lawn areas shall slope to drain.
   2. Where no grades are shown, areas shall have smooth and continual grade between existing or fixed controls, such as walks, curbs, catch basin, steps, or building, and elevations shown on The Drawings. Roll, scarify, rake, and level as necessary to obtain true, even lawn surfaces. Finish grades shall meet approval of Owner or Landscape Architect before grass seed is sown.
   3. Loosen soil to depth of 6 inches in lawn areas by approved method of scarification and grade to remove ridges and depressions. Remove stones or foreign matter over 2 inches in diameter from top 2 inches of soil. Float lawn areas to finish grades.
   4. Seed beds shall be permitted to settle or shall be firmed by rolling before seeding begins.

H. Sod Bed Preparation: Grade areas to finish grade, filling as needed or removing surplus dirt, stones, debris, etc. and floating areas to smooth, uniform grade as indicated on The Drawings. Lawn areas shall be graded to drain.

I. Fertilizer Application: Apply fertilizer in two applications and water immediately following each application. The first application shall be one week prior to seeding/sodding at the rate of 25 pounds per 1000 square feet and barrowed into the top two inches of topsoil. The second application shall be at the rate of 10 pounds per 1000 square feet immediately following the second mowing.

3.2 PROTECTION

A. Before commencing work, trees and shrubs that are to be saved shall be protected from damage by placement of fencing flagged for visibility or some other suitable protective procedure approved by Owner or Landscape Architect.

B. Trucks or other equipment shall not be driven or parked within drip line of any tree unless tree overspreads paved area.

C. Use precautionary measures when performing work around trees, sidewalks, pavements, utilities, and other features either existing or previously installed.

D. Adjust depth of earthwork and topsoil when working immediately adjacent to aforementioned features in order to prevent disturbing tree roots, undermining sidewalks and pavements, and damage in general to other features either existing or previously installed.

E. Cover plants transported to project in open vehicles with tarpaulins or other suitable covers securely fastened to body of vehicle to prevent injury to plants. Closed vehicles shall be adequately ventilated to prevent overheating of plants. Evidence of inadequate protection following digging, carelessness while in transit, or improper handling or storage shall be cause for rejection. Plants shall be kept moist, fresh, and protected. Such protection shall encompass entire period during which plants are in transit, being handled, or are in temporary storage.

F. Where excavating, fill, or grading is required within drip line of trees that are to remain, work shall be performed as follows:
   1. Trenching: When trenching occurs around trees to remain, tree roots shall not be cut but trench shall be tunneled under or around roots by careful hand digging without injury to roots.
   2. Raising Grades:
      a. Where fill not exceeding 16 inches is required, clean, washed gravel graded from 1 inch to 2 inches in size shall be placed directly around tree trunk. Extend gravel out from trunk on all sides minimum of 18 inches and finish approximately 2 inches above finished grade at tree. Install gravel before any earth fill is placed. New earth fill shall not be left in contact with trunks of trees requiring fill.
      b. Where fill exceeding 16 inches is required, construct dry-laid tree well around trunk of tree. Tree well shall extend out from trunk on all sides minimum of 3 feet and to 3 inches above finish grade. Place coarse-graded rock directly around tree well extending out to drip line of tree. Place clean, washed gravel graded from 1 inch to 2 inches in size directly over coarse rock to depth of 3 inches. Place approved backfill material directly over washed gravel to desired finish grade.
   3. Lowering Grades: Existing trees in areas where new finish grade is to be lowered shall have re-grading work done by hand to elevation indicated on The Drawings. Roots as required shall be cut cleanly 3 inches below finished grade and scars covered with tree paint.
   4. Trees marked for preservation that are more than 6 inches above proposed grades shall stand on broad rounded mounds and graded smoothly into lower level. Trees located more than 16 inches above proposed grades shall have dry-laid stone wall or other retaining structure as detailed on The Drawings constructed minimum of 5 feet from trunk. Exposed or broken roots shall be cut clean and covered with topsoil.

## 3.3 TREE AND SHRUB PLANTING

A. Plants too large for 2 persons to lift in and out of holes shall be placed with sling. Do not rock trees in holes to raise.

B. If rock or other underground obstruction is encountered, Owner may require plant pits to be relocated, pits enlarged, or plants deleted from project.

C. Make adjustments in locations as directed. In event that pits or areas for planting are pre- pared and backfilled with topsoil to grade prior to commencement of lawn operations, they shall be so marked that when planting proceeds, they can be readily located. In case under- ground obstructions such as ledges or utilities are encountered, change location under direction of Owner without charge.

D. Holes for trees shall be at least 2 feet greater in diameter than spread of root system and at least 6 inches deeper than root ball. Holes for shrubs and vines shall be at least 12 inches greater in diameter than spread of root system and at least 2 feet deep.

E. During backfilling of tree holes and shrub beds with topsoil, manure, ground limestone (if soil tests indicate it is needed), and commercial fertilizer at rate of 3 pounds for trees up to 3 inches in caliper, 1 pound per inch caliper for larger trees, 6 ounces for small shrubs and 8 ounces for each shrub 4 feet or over shall be added as progress of work permits. Omit ground limestone and manure in case of acid soil plants. Manure, limestone, and fertilizer shall be thoroughly mixed with topsoil in planting operation. Manure shall not come in immediate contact with- roots.

F. Plants shall be planted in center of holes and at same depth as they had previously grown. Backfill topsoil in layers of not more than 8 inches and each layer watered sufficiently to settle before next layer is placed. Tamp loam under edges of balled plants. Use enough topsoil to bring surfaces to finish grade when settled.
   1. Provide saucer around each plant as shown on The Drawings.
   2. Soak plants with water twice within first 24 hours after time of planting. Apply water with low pressure so as to soak in thoroughly without dislodging topsoil.

3.4 MISCELLANEOUS INSTALLATIONS

A. Shredded Hardwood Bark Mulch
   1. Use 3 inches of shredded hardwood bark mulch or approved equal as top dressing in planting beds. Mulch single trees or shrubs to outside edge of saucer.
   2. Place weed mat under planting areas not to be seeded, or as directed on The Drawings. Cover mat with mulch and secured in place with soil anchor.

B. Use peat moss for planting soil mixture only and not be used as mulch, except on ground cover.

C. Peg sodded slopes greater than 3:1 to hold in place.

D. Areas to be covered with erosion control blankets shall be properly prepared, fertilized, and seeded before blanket is applied. When blanket is unrolled, netting shall be on top and fibers in contact with soil. In ditches, apply blanket in direction of flow of water. On slopes, apply blankets vertically on slope. Butt ends and sides snugly and staple to manufacturer's recommendations.

3.5 SEEDING

A. Do not perform seeding in windy conditions.

B. Seeding shall be dispersed in 2 directions at right angles to each other.

C. Seed lawn areas by sowing evenly with approved mechanical seeder at rate of minimum of 3 pounds per 1,000 square feet. Culti-packer or approved similar equipment may be used to cover seed and to form seedbed in 1 operation. In areas inaccessible to culti-packer, lightly rake seeded ground with flexible rakes and roll with water ballast roller. After rolling, seeded areas shall be lightly mulched with wheat straw.

D. Surface layer of soil for seeded areas shall be kept moist during germination period. Water seeded areas twice first week to minimum depth of 6 inches with fine spray and once per week thereafter as necessary to supplement natural rain to equivalent of 6 inches depth.

3.6 SODDING

A. Cut and lay sod on same day. Only healthy vigorous growing sod shall be laid.

B. Lay sod across slope and tightly together to result in solid coverage free of gaps.

C. Roll or firmly but lightly tamp new sod with suitable wooden or metal tamper sufficiently to set or press sod into underlying soil.

D. After sodding has been completed, clean up and thoroughly water newly-sodded areas.

3.7 MAINTENANCE DURING CONSTRUCTION

A. Begin maintenance immediately after planting. Plants shall be watered, mulched, weeded, pruned, sprayed, fertilized, cultivated, and otherwise maintained and protected until acceptance. Settled plants shall be reset to proper grade and position, planting saucer restored, and dead material removed and replaced. Tighten and repair stakes and wires. Correct defective work as soon as possible after it becomes apparent and weather and season permit.

B. Maintain lawns for at least 30 days after sodding and 60 days after seeding, or as long as is necessary to establish uniform stand of the specified grasses, or until substantial completion of project, or until acceptance of lawns, whichever is later.

C. In event that lawn operations are completed too late in Fall for adequate germination and/or growth, maintenance shall continue into following growing season or until uniform stand of specified grasses has been established.

D. Make weekly inspections to determine moisture content of soil and adjust watering schedule established by irrigation system installer to fit conditions.

E. After grass growth has started, areas that fail to show uniform stand of grass for any reason whatsoever shall be reseeded in accordance with The Drawings and as specified herein. Such areas shall be reseeded repeatedly until areas are covered with satisfactory growth of grass at no additional cost to Owner. Topsoil conditioning or removal and replacement shall be performed if required to facilitate establishment of grass at no cost to Owner.

F. Watering shall be done in such manner and as frequently as is deemed necessary by Owner to assure continued growth of healthy grass. Water areas of site in such a manner as to prevent erosion due to excessive quantities applied over small areas and to avoid damage to finished surface due to watering equipment.

G. Water for execution and maintenance shall be provided by Contractor at no expense to Owner. Contractor shall furnish portable tanks, pumps, hose, pipe, connections, nozzles, and any other equipment required to transport water from available outlets and apply it to seeded areas in approved manner.

H. Initiate mowing of seeded areas when grass has attained height of 3 inches. Maintain grass height at 2 1/2 to 3 inches at subsequent cuttings depending on time of year. Not more than

1/3 of grass leaf shall be removed at any cutting and cutting shall not occur more than 10 days apart.

I. Heavy cuttings shall be removed to prevent destruction of underlying turf. If weeds or other undesirable vegetation threaten to smother planted species, such vegetation shall be mowed or, in case of rank growths, shall be uprooted, raked and removed from area by methods approved by Owner or Landscape Architect.

J. Protect seeded areas from pedestrian or vehicular trespassing while grass is germinating. Provide fences, signs, barriers, or other necessary temporary protective devices. Repair damage resulting from trespass, erosion, washout, settlement, or other causes.

K. Remove fences, signs, barriers, or other temporary protective devices after final acceptance.

L. If substantial number of plants are diseased, distressed, or dead at time of inspection, acceptance will not be granted and Contractor's responsibility for maintenance of plants shall be ex- tended until replacements are made.

M. Replacements shall be plants of same variety and size specified on The Drawings. Furnish and plant as specified herein. Cost shall be borne by Contractor. Replacements resulting from removal, loss, or damage due to occupancy of project in any part, vandalism, physical damage by animals, vehicles, etc., and losses due to curtailment of water by local authorities will be approved and paid for by Owner.

N. Remove and replace dead, defective and/or rejected plants as required before final acceptance. Replacement of plant materials that may be necessary shall be at expense of Con- tractor.

O. Grassed areas damaged during process of work shall be responsibility of Contractor, who shall restore disturbed areas to condition satisfactory to Owner. This may include filling to grade, fertilizing, seeding, and mulching.

P. Guarantee plants for period of 1 year after inspection and acceptance.

Q. At end of Establishment Period, inspection shall be made again. Remove from site any plant that is dead or unsatisfactory to Owner. Replace plants during normal planting season.

3.8 MAINTENANCE AFTER CONSTRUCTION (Optional services to be approved by Owner)

A. Maintenance after construction shall be commenced upon completion of a Maintenance Agreement based on proposal submitted by the Contractor specified in Part 1 above. The Maintenance Agreement and the maintenance work shall conform to the following requirements.

B. General Landscaping
   1. Landscape maintenance shall include necessary watering, cultivation, weeding, pruning, wound dressing, disease and insect pest control, protective spraying, labor for replacement of dead plant material, straightening plants which lean or sag, adjustments of plants which settle or are planted too low, mowing, replacement of mulch that has been displaced, repairing and reshaping of saucers, and reseeding or replanting of those areas affected. Remove rubbish, waste, tools, and equipment used at end of each work

day. Other procedures consistent with good horticultural practice necessary to ensure vigorous, healthy growth of plant material are also part of Maintenance Contract.

2. During first year of Maintenance Contract, replacement of plant material shall be responsibility of Contractor with exceptions as listed herein.

3. Landscape maintenance contractor shall purchase and maintain Contractor's general liability insurance in amount of $1,000,000 for protection from Contractor's operations under Maintenance Contract. Certification of such insurance shall be filed with Owner prior to commencement of work.

C. Watering
1. The Owner's irrigation system shall be used by landscape maintenance contractor for watering. Failure of system does not relieve landscape maintenance contractor's responsibility of maintaining desired level of moisture necessary to maintain vigorous, healthy growth.
2. Water shall be applied in quantities sufficient to penetrate soil to minimum depth of 8-inches in shrub beds and 6-inches in turf areas at rate that will prevent saturation of soil.
3. On-site water will be furnished by Owner. Contractor shall furnish hose and other watering equipment.

D. Weeding: Landscape maintenance contractor shall keep areas free from weeds and undesirable grasses by approved methods and materials.

E. Disease and insect pest control: Inspect plant material at least once each month to locate any disease or insect pest infestations. Upon discovery of infestation, nature or species of infestation shall be identified. Control in accordance with industry standards shall be immediately implemented.

F. Fertilizing: Landscape maintenance contractor shall fertilize on regularly scheduled program to fit requirements of plant material to maintain vigorous, healthy growth. Spilled or excess fertilizer shall be swept and properly disposed. Flushing into storm sewer is prohibited.

G. Pruning and repair: Amount of pruning shall be limited to minimum necessary to remove dead or injured branches, to compensate for loss of roots as result of transplanting operations, and to maintain safety in traveled areas. Pruning shall not change the natural habit or attractive, balanced shape of plant. Cuts shall be made flush, leaving no stubs.

H. Mowing: Mow grass areas at regular intervals to keep grass height from exceeding 3-inches. Mow in such manner as to prevent clippings from blowing onto paved areas and sidewalks. Cleanup after mowing shall include sweeping or blowing to clear mowing debris.

I. Clean up: During course of maintenance, excess and waste materials shall be continuously and promptly removed at end of each workday.

J. Maintenance report and schedule of activities: Landscape maintenance contractor shall provide schedule and report to Owner that details planned maintenance activities including names of any subcontractors.

K. General Irrigation:
1. After 1-Year Maintenance Agreement has expired, landscape maintenance contractor shall maintain irrigation system in good operating condition through monthly inspections of system components and make repairs as necessary. This includes checking and verifying

operation in each zone, alignment of heads, rain sensors, controller, and checking leaks.

2. Landscape maintenance contractor shall make every effort to conserve water by adjusting programming to allow for weather changes and growth seasons. Irrigation should be conducted between 2:00 a.m. and 6:00 a.m. unless requested by Owner.

L. Winterization:
   1. When cold weather approaches and chance for freezing conditions exist, the irrigation system shall be drained after each use.
   2. Winterization procedure shall include the following:
      a. Shut water off at main gate valve
      b. Open manual drain valves
      c. Blow out each section twice with compressed air
      d. Set controller to cycle through each section minimum time available, once each day through winter months.
      e. If backflow preventer is installed with unions, remove and store out of weather.

M. Spring Start-up: Spring start-up procedure shall include the following:
   1. Reinstall backflow prevention
   2. Close manual drain valves
   3. Slowly turn water on
   4. Check for leaks and proper alignment of heads
   5. Repair and adjust system as required for proper operation

N. Component Replacement: If replacement of component parts becomes necessary after normal use and after original warranty has expired, Owner is responsible for expense of replacements, provided there has been no mishandling of these items on part of landscape maintenance contractor.

O. Termination Of Maintenance Contract:
   1. If Owner fails to make payment for period of 90 days without written clarification, landscape maintenance contractor may, upon 12 additional days written notice to Owner, terminate contract and recover from Owner payment for work executed and for proven loss sustained upon materials, equipment, or tools, including reasonable profit and damages applicable to Maintenance Contract.
   2. If landscape maintenance contractor defaults, persistently fails, or neglects to carry out work in accordance with Maintenance Contract, Owner, after 12 days written notice to landscape maintenance contractor and without prejudice to any other remedy Owner may have, may make good such deficiencies, including compensation for additional services made necessary, and deduct cost from payment due landscape maintenance contractor or Owner may terminate Maintenance Contract.

END OF SECTION

SECTION 029100 – SYNTHETIC TURF

PART 1 – GENERAL

**1.1 DESCRIPTION OF WORK**

1. Provide all labor, materials, equipment, and tools necessary for the complete installation of synthetic grass playground surfacing. Surface shall meet the requirements of ASTM F1292-13, that states that the surface must yield both a peak deceleration of no more than 200 g's and a Head Injury Criteria (HIC) value of no more than 1,000 for a headfirst fall from the accessible height of the play equipment within the fall zone areas.. System must be IPEMA certified and supported by test data that is less than 3 years executed. Test data alone is not considered to be preferred supportive documentation. The system shall consist of, but not necessarily be limited to, the following:
    a. Synthetic grass consisting of fibers that are 1.25" long. Turf fiber construction consisting of 100% nylon monofilament and texturized nylon thatch tufted to a 2-layer stabilized woven polypropylene fabric (primary backing), with a secondary backing (stitch binder) of punched urethane or approved equal.
    b. Pad underlayment system consisting of porous closed cell composite materials. Thickness and density of panels shall be sufficient so that system meets the requirements of ASTM F1292-13. (SofPad™)
    c. Synthetic Grass Infill, consisting of anti-microbial acrylic coated round silica particles, designed to provide the look, feel, and performance of optimally maintained natural grass to be installed in the fall zones. (EnviroFill®)
    d. 3/4" clean aggregate, ½" screenings, compacted 4" deep
    e. Synthetic grass shall be CPSIA compliant with valid supporting test documents.
    f. Synthetic grass shall be manufactured exclusively in the USA, finished goods manufactured outside of the USA will be accepted.

**1.2 SUBMITTALS**

1. Product Data: Submit manufacturer's product data, including installation instructions and subsurface instructions.
2. Samples: Submit samples of synthetic grass, infill, pad underlayment.
3. Warranty: Submit manufacturer's standard 10-year warranty.

**PART 2 – PRODUCTS**

**2.1 SYNTHETIC GRASS SAFETY SURFACE**

1. Aggregate Base – 1/2" Screenings, 3/4" Clean Aggregate, Compacted 4" deep (Refer to Section 3.2-3).
2. Synthetic grass: XGrass® Fringe Turf from XGrass, 205 Boring Dr. Dalton, GA 30721, Phone (877) 881-8477
    a. Face Weight: 54 oz/sy

b. Pile Height: 1.25"
c. Face Yarn Type: Nylon
d. Denier: 4200
e. Color: Field Green/Clover
f. Construction: Broadloom tufted
g. Stitch Rate: 8 per 3 inches
h. Tufting Gauge: 3/8"
i. Primary Backing: 8.0 oz/sy
j. Secondary Backing: 20 oz/sy Urethane
k. Total Product Weight: 82 oz/sy
l. Finished Roll Width: 180" untrimmed
m. Warranty: 10 Year UV
n. Manufactured in the USA, Internationally manufactured products will not be accepted

3. Pad Underlayment System: SofPad™ (to be utilized in fall zone areas specifically) 100% recycled, non-contaminated, Post industrial cross-link, closed cell Polyethylene – polyolefin foam pad from XGrass.
    a. Foam Type: Polyethylene – Polyolefin
    b. Bulk Density: 5.0-8.0 lb/cu ft
    c. Effective Size: 24 sq ft (net coverage)
    d. Tensile Strength: 34-36 psi

4. Synthetic Grass Infill: EnviroFill® from XGrass, 205 Boring Drive. Dalton, GA 30721, Phone (877) 881-8477. Coating: Priority acrylic with Microban®, iron oxide and chromium oxide.
    a. Grain shape: Round
    b. Hardness: 6-8 Mohs
    c. Curvature: 0.7+
    d. Specific Gravity: 1.76 g/cm3
    e. Bulk Density: 110 lb/cu ft
    f. Uniform Coefficient: 1.10 to 1.40
    g. Effective Size: .84 - 1.68 mm

5. Splicing Material: Red Stripe
6. Adhesive: Turf Claw 75 UP

**PART 3 – EXECUTION**

**3.1 GROUND PREPARATION**

1. General: The ground area to receive synthetic grass safety surface is indicated on the Drawings.
2. Leveling and Site Preparation: All organic material and organic debris to be removed.

Soil to be graded level and stabilized (compacted) 6 " below grade, per site requirements. Compaction shall be done with mechanical compactors, including vibratory compactors, and/or powered tampers, and rollers.

**3.2 BASE AND SYNTHETIC GRASS CONSTRUCTION**

1. General: The area to be smooth and graded to allow for proper drainage. Refer to engineered grading plan if available. The overall grade of the playground is not to exceed 3%.

2. Nailer Board: Installation of pressure treated or composite board per site requirements.
    a. Concrete edges: Nailer board attached directly to vertical concrete edge with Tapcon hardware positioned 3/4" below concrete grade.
    b. Non-concrete edges: Nailer board installed with round, steel stake, 3 per 10' board. Top of nailer boards to be situated 3/4" below grade.
3. Compacted Aggregate Base: Place 4" of 3/4" clean aggregate base and 1/2" of screening as leveling layer compacted to 90% of max density per AASHTO T99. Compaction shall be done with mechanical compactors, including vibratory compactors, and/or powered tampers, and rollers.
4. Underlayment Pad: Lay underlayment pad with seam staggered, trimming edge to fit flush against the nailer board. Sofplay pad to be installed in areas requiring fall height attenuation specific to the fall height requirements and correlating to the IPEMA certification.
5. Synthetic Grass: Place turf and cut to fit configuration as shown on Drawings. Splice seams. All seams must be attached with splicing film/fabric and adhesive as approved by the manufacturer for this type of installation of their product.
6. Anchoring/Edging: Edges of turf will be secured to nailer board perimeter.
7. Infill: Apply layers of synthetic grass infill evenly with a drop spreader and broom the turf fibers with stiff bristle broom to stand fibers up and allow infill to settle into the bottom. Broom in infill at the rate of 3 pounds per square foot.

**PART 4 – WARRANTY**

**4.1 WARRANTY**

1. Please refer to the current XGrass warranty for details.

END OF SECTION 029100

# SECTION 033000 - CAST-IN-PLACE CONCRETE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes. Concrete curbs, gutters, and walkways are included.

B. See Division 2 Section "Earthwork" for drainage fill under slabs-on-grade.

### 1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture.

C. Shop Drawings: For steel reinforcement.

D. Material certificates.

### 1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment. All cement shall be provided by a single domestic manufacturer.

B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete,"
2. ACI 302.1 R "Guide for Concrete Floor and Slab Construction."
3. ACI 304 "Guide for Measuring, Mixing, Transporting and Placing Concrete."
4. ACI318 "Building Code Requirements for Reinforced Concrete."
5. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
6. Concrete Reinforcing Steel Institute "Manual of Standard Practice.
7. ASTM E 1155-96 "Standard Test Method for Determining Floor Flatness and Levelness Using the F-Number System."
8. ASTM 154-99 "Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs."
9. ASTM E 1643-98 "Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under concrete slabs."

C. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Curves shall be uniform and free of form marks.

D. Form Coatings: Use non-staining release agents approved by concrete manufacturer that will not discolor, deface, or impair finish or treatment of concrete.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
1. Weldable Rebar: ASTM A 706

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets. Rolled fabric prohibited.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I. Supplement with the following:

a. Fly Ash: ASTM C 618, Class C or F, not to exceed 20% of cement content by weight. Do not use when ambient air temperatures are expected to be below 35 degrees F during the first 48 hours after placement. Do not use in mix designs where concrete will be exposed to view.

B. Normal-Weight Aggregates: ASTM C 33.

1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Lightweight Aggregate: ASTM C 330.

D. Water: ASTM C 94/C 94M and potable.

E. Air-Entraining Admixture: ASTM C 260.

F. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 VAPOR RETARDERS – See Section 071900 – Vapor Retarder

2.5 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Curing and Sealing Compound shall be two coat type acrylic based, non yellowing and compatible with all floor finishes and adhesives. Do not install in areas to receive quarry tile, ceramic tile or porcelain tile. Use two coat, non-slip type, guaranteed for 5 years against dusting and chalking.

E. Chemical Hardener: Colorless solution of magnesium fluosilicate, zinc fluosilicate and wetting agent containing not less than 2lb flusilicates per gallon.
1. Acceptable products:
    a. Sonneborn
    b. Lapidolith
    c. Dayton Superior
    d. Day-Chem Hardener

F. Water: Potable.

2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.7 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio:
   a. Subject to freezing and thawing: 0.50.
   b. Subject to deicers/watertight: 0.45
3. Slump Limits at point of placement:
   a. Ramps and sloping surfaces: 3" max.
   b. Reinforced foundation systems: Not less than 1" and not more than 4".
   c. Slabs and other concrete: 4" max.
4. Air Entrainment: Use air-entraining admixture resulting in concrete with air content at point of placement as follows:
   a. Concrete exposed to freezing/thawing, deicer chemicals, or hydraulic pressure:
      1) 4.5% (moderate exposure); 5.5% (severe exposure) 1-1/2" max. aggregate.
      2) 4.5% (moderate exposure); 6.0% (severe exposure) 1" max. aggregate
      3) 5.0% (moderate exposure); 6.0% (severe exposure) 3/4" max. aggregate
      4) 5.5% (moderate exposure); 7.0% (severe exposure) 1/2" max. aggregate
   b. Other Concrete: 2% to 4% air.
5. Portland Cement Paving, Sidewalks and Curbs:
   a. 4,000 p.s.i. at 28 days curing.
   b. Air Entrainment: 4% to 7%
   c. Slump: 3"
   d. Water/Cement Ratio: per article 2.7.B.2 above.

2.8 MISCELLANEOUS MATERIALS

A. Accessible Ramps: Impart color with integrally colored concrete.
1. Red Color (for accessible ramps): Natural or synthetic mineral oxides complying with ASTM C-979 blended at batch plant.
   a. Acceptable Products:
      1) Bayferrox iron oxide pigment by Bayer Corp, color#110 (4 lbs)
      2) Davis Colors, Mix-Ready, Color Baja Red #160 (2 lbs)
      3) Chromix by L.M. Scofield CO., color C-22 Coral Red.

B. Precast Concrete shall be minimum 5000 psi 28 day strength. Precast splash blocks to be minimum 4000 psi 28 day strength. All precast to have hot dipped galvanized reinforcing.

C. Non-slip Aggregate shall be "Alumogrit" aluminum filings.

2.9 FABRICATING REINFORCEMENT

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

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117. Install clean, straight, solid surface and true to plane.

C. Chamfer exterior corners and edges of permanently exposed concrete.

D. Use earth forms only where earth is dry, stable and hidden from view.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded. Locate items as per approved submittals.

3.3 VAPOR RETARDERS

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions. Refer to Section 07190 – Vapor Retarder for installation instructions.

1. Lap joints minimum 6 inches as per manufacturer's recommendations and seal with manufacturer's recommended tape.

2. Protect from damage and punctures and repair all such damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

2. For slabs on grade use reinforcing support to ensure proper clearance/cover. Do not pull reinforcing through placed concrete.

3. Install materials and spacings per approved submittals, discontinuous and held back from joints as required. Set and secure to required clearances from earth and form work.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete. Locate as per approved submittals.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, sprinkler mains, drain piping, and immovable objects.

E. Site Concrete: at concrete pavements and curbs, provide contraction joints at 12' o.c. maximum. Joint patterns in pavements and sidewalks shall be generally square. At curbs provide full depth expansion joints at 20'o.c. maximum. At sidewalks, provide weakened plane contraction joints not more than 5'-0" max. and expansion joints at 20 feet o.c. maximum. Tool all edges. Install self-leveling sealant at all isolation/expansion joints.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed. Protect adjacent finishes and materials from splatters.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301. Contractor shall maintain spare vibrator on site during all placement.

C. Place concrete in/on properly prepared sub-base or forms. Place concrete slabs directly on water vapor retarder. Provide not less than 6" of prepared granular sub-base between water vapor retarder and ground.
1. Install water vapor retarder in compliance with ASTM E 1643.
2. Lap joints 6 in. and seal with manufacturers adhesive or tape.
3. Seal around all penetrations with manufacturers pipe boot or by wrapping with vapor retarder and taping.
4. Repair all punctures and cuts using vapor retarder material lapped 6 inches beyond damaged area and taped.

D. Cold-Weather Placement: Comply with ACI 306.1.

E. Hot-Weather Placement: Comply with ACI 301.

F. Do not place concrete on/in frozen sub-base or forms.

G. Pumping Concrete: Concrete may be placed by pumping if first approved in writing by the Architect/Engineer of record. Pumped concrete shall only be placed in the presence of the Testing/Inspecting Agent.
1. Equipment: Pumping equipment shall be of the size and design that ensures a continuous flow of concrete at the delivery end without separation of materials. Do not pump concrete through aluminum pipes.
2. Concrete mix: Shall conform to the project specifications, except that mix may contain chemical admixtures to allow proper pumping. Include the specified high-range or mid-range water reducing admixture in the mix. Unless strictly controlled and anticipated in the development of the design mix, the addition of admixtures at the jobsite shall be prohibited.

## 3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until

producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

## 3.8 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Float slabs with a highway straight edge in lieu of a conventional bull float. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces to all interior slabs, including slabs to receive VCT, rubber flooring, entry tiles, carpet, concrete sealer and similar finishes.

D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated, perpendicular to traffic. Tool all edges to 1/2" radius unless noted otherwise.

E. Apply concrete hardener to exposed interior floors and exterior slab at recessed entrance.

F. Floors to receive resilient flooring shall limit moisture vapor emission to not more than 3 pounds per 1,000 square feet per 24 hours, in compliance with ASTM F-1869.

G. Provide a floor surface which is true and level and achieves "F Numbers" of $F_F$ = 30 and $F_L$ = 20 minimum overall composite and $F_F$ = 20 and $F_L$ = 15 minimum at any individual section, when tested in accordance with ASTM E 1155. Remove surface irregularities to provide a continuous smooth finish.

H. Repair or replace broken, defective and stained concrete, and replace non-conforming concrete, all as directed by owner.

I. Install non-slip aluminum grit to exterior steps and ramps. Apply at 25 pounds per 100 square feet and work evenly into surface.

## 3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

## 3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval. Accomplish immediately after form removal by working in slurry from adjacent concrete to maintain homogenous mix and uniform coloration.

## 3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Employ at the owner's expense, a testing laboratory, acceptable to owner, to perform concrete testing as described in paragraph 1.6 of Section 01400, Testing Laboratory Services. Any variation from Section 01400 must be approved in advance by the Architect.

B. Testing:

1. All performed by an independent testing laboratory.

2. All (except retests and "false start calls") shall be paid by Owner; Contractor to pay for exceptions. Lab to invoice separately.

3. Architect will obtain proposals for testing services and make a recommendation to the Owner. Owner will approve the services of a testing laboratory and the Architect will contract for the services, within 10 days after Owner's "Notice of Award" to Contractor.

4. Contractor Duties: Notify Lab prior to concrete placements; give Lab at least 24 hours notice.

5. Lab Duties: Make cylinders, date, identify placement locations, store for lab pick-up. Retrieve cylinders from site, test, and provide written report to CCSD Project Manager, the A./E, the Contractor, and the concrete supplier. Immediately after testing, notify all parties of any low break, results by FAX transmittal.

6. Lab Invoicing: Lab to send invoice with required back-up to A/E for endorsement; A/E forwards to Owner with recommendation for payment.

C. Concrete not conforming to requirements of construction documents or which fails required Quality Assurance testing, including Flatness/Levelness requirements, shall be removed and replaced at owner's discretion.

END OF SECTION 033000

# SECTION 042000 – UNIT MASONRY

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units (CMU's).
2. Concrete building brick.
3. Face brick.
4. Building (common) brick.

B. Products Installed but not Furnished under This Section:

1. Cast-stone trim in unit masonry.
2. Steel lintels in unit masonry.
3. Steel shelf angles for supporting unit masonry.
4. Cavity wall insulation.

C. Related Sections:

1. Division 01 Section "Allowances" for brick.

### 1.2 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

1. Clay Masonry Unit Test: For each type of unit required, according to ASTM C 67 for compressive strength.
2. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.
3. Grout Test (Compressive Strength): For each mix required, according to ASTM C 1019.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."

C. Samples for Verification: For each type and color of exposed masonry unit and colored mortar.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product indicated. For masonry units include data on material properties.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.5 QUALITY ASSURANCE

A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

B. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Division 01 Section "Quality Requirements" for mockups.

1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 60 inches long by 48 inches high.

1.6 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than that of CMUs.

C. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout.

2.3 BRICK

A. General: Provide shapes indicated and as follows:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Face Brick: Facing brick complying with ASTM C 216.

1. Products: Subject to compliance with requirements, and **Architect/Owner approval, provide sample panel or area on building for approval**.

2. Grade: SW.
3. Type: FBS
4. Size: **Match existing**.

C. Building (Common) Brick: ASTM C 62, Grade SW.

1. Size: Match size of face brick.
2. Products: Subject to compliance with requirements, provide the following:

a. Brick compatible with Face Brick.

3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
4. Size (Actual Dimensions): Match face brick.

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

a. See Editing Instruction No. 1 in the Evaluations for cautions about naming manufacturers and products.

2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Davis Colors; True Tone Mortar Colors.
b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
c. Solomon Colors, Inc.; SGS Mortar Colors.
d. Approved equal prior to bid.

3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Colored Portland Cement-Lime Mix:

1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
3) Lafarge North America Inc.; Eaglebond Portland & Lime.
4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

D. Aggregate for Mortar: ASTM C 144.

1. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
2. White-Mortar Aggregates: Natural white sand or crushed white stone.
3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

E. Aggregate for Grout: ASTM C 404.

F. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ACM Chemistries; RainBloc for Mortar.
b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.

c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.

G. Water: Potable.

2.5 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Interior Walls: Hot-dip galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized carbon steel.
3. Wire Size for Side Rods: 0.148-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Wire Size for Veneer Ties:0.148-inch diameter.
6. Spacing of Cross Rods: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

2.6 TIES AND ANCHORS

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

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.

1. Wire: Fabricate from 1/4-inch- diameter, hot-dip galvanized-steel wire.

D. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Tie Section: Triangular-shaped wire tie made from 0.25-inch-diameter, hot-dip galvanized-steel wire.

E. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Tie Section: Triangular-shaped wire tie made from 0.25-inch diameter, hot-dip galvanized-steel wire.

2. Corrugated-Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.105-inch- thick steel sheet, galvanized after fabrication with dovetail tabs for inserting into dovetail slots in concrete.

F. Partition Top Anchors: 0.105-inch- thick metal plate with a 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

G. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist a 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.
2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.105-inch thick steel sheet, galvanized after fabrication.
3. Fabricate wire ties from 0.25-inch- diameter, hot-dip galvanized-steel wire unless otherwise indicated.
4. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a rib-stiffened, sheet metal anchor section.

    a. Products: Subject to compliance with requirements, provide one of the following:

        1) Dayton Superior Corporation, Dur-O-Wal Division; D/A 213 or D/A 210 with D/A 700-708.
        2) Heckmann Building Products Inc.; 315-D with 316.
        3) Hohmann & Barnard, Inc.; DW-10HS or DW-10-X.
        4) Wire-Bond; 1004, Type III or RJ-711.
        5) Approved equal prior to bid.

    b. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, having slotted holes for inserting wire tie.
    c. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch- (1.90-mm-) thick, steel sheet, galvanized after fabrication.
    d. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.187-inch- (4.76-mm-)diameter, hot-dip galvanized steel wire.

5. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a gasketed sheet metal anchor section, with pronged legs of length to match thickness of insulation or sheathing and raised rib-stiffened strap to provide a slot for inserting wire tie.

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

        1) Hohmann & Barnard, Inc.
        2) Wire-Bond.
        3) Approved equal prior to bid.

6. Seismic Masonry-Veneer Anchors: Connector section and rib-stiffened, sheet metal anchor section with screw holes top and bottom, and having slotted holes for inserting connector section. Connector section consists of a rib-stiffened, sheet metal bent plate, sheet metal clip, or wire tie with rigid PVC extrusion designed to engage continuous wire.

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

        1) Dur-O-Wal; a Hohmann & Barnard company.
        2) Hohmann & Barnard, Inc.
        3) Wire-Bond.
        4) Approved equal prior to bid.

7. Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except with hex washer head and neoprene or EPDM washer, No. 10 diameter, and with coating with salt-spray resistance to red rust of more than 800 hours according to ASTM B 117.

H. Anchor Bolts: L-shaped steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

2.7 EMBEDDED FLASHING MATERIALS

1. Copper-Laminated Flashing: 5-oz./sq. ft. copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

        1) Advanced Building Products Inc.
        2) Hohmann & Barnard, Inc.
        3) York Manufacturing, Inc.
        4) Approved equal prior to bid.

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

2.8 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weep/Vent Products: Use one of the following unless otherwise indicated:

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

1) Advanced Building Products Inc.; Mortar Maze weep vent.
2) Blok-Lok Limited; Cell-Vent.
3) Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
4) Heckmann Building Products Inc.; No. 85 Cell Vent.
5) Hohmann & Barnard, Inc.; Quadro-Vent.
6) Wire-Bond; Cell Vent.
7) Approved equal prior to bid.

2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
a. Advanced Building Products Inc.; Mortar Break
b. Archovations, Inc.; CavClear Masonry Mat.
c. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
d. Mortar Net USA, Ltd.; Mortar Net.
e. Approved equal prior to bid.

f. Strips, full-depth of cavity and 10 inches (250 mm) high, with dovetail shaped notches 7 inches (175 mm) deep.

## 2.9 MASONRY CLEANERS

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Diedrich Technologies, Inc.
b. EaCo Chem, Inc.
c. ProSoCo, Inc.
d. Approved equal prior to bid.

## 2.10 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

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

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced masonry, use Type M or Type S.
3. For mortar parge coats, use Type S.

D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products].

1. Pigments shall not exceed 10 percent of portland cement by weight.
2. Pigments shall not exceed 5 percent of masonry cement by weight.
3. Application: Use pigmented mortar for exposed mortar joints with the following units:

    a. Concrete facing brick.
    b. Face brick.
    c. Hollow brick.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

1. Mix to match Architect's sample.
2. Application: Use colored aggregate mortar for exposed mortar joints with the following units:

    a. Concrete facing brick.
    b. Face brick.
    c. Hollow brick.

F. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
3. Provide grout with a slump of 8 to 11 inches (203 to 279 mm) as measured according to ASTM C 143/C 143M.

G. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.

2.11 CAVITY-WALL INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type X, closed-cell product extruded with an integral skin.

Revise paragraph below to suit insulation selected.

B. Adhesive: Type recommended by insulation board manufacturer for application indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

Retain paragraph below for high-suction brick. A simple test to determine if wetting is required consists of drawing a circle the size of a quarter on a brick and placing 20 drops of water in the circle; if water is absorbed within 1-1/2 minutes, the brick requires wetting.

C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.

4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet, or 1/2 inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch , with a maximum thickness limited to 1/2 inch.
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

## 3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Set stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.

C. Bond Pattern for Exposed Masonry: Match existing patterns unless otherwise indicated. Match exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

D. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.

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

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

G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

## 3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow brick and CMUs as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.

2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

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

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 CONTROL AND EXPANSION JOINTS

A. General: Build-in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement. Install control and expansion joints, as recommended by the Brick Institute of America, where shown on the Drawings. If not shown, then install 3/8 inch to 1/2 inch wide, as follows:

B. Expansion Joints
1. Make joints 1 inch wide unless indicated otherwise
2. Form with a continuous unobstructed opening full depth of veneer
3. Vertical Joint Spacing: As recommended by the BIA or
   a. Sections Without Openings: 25 feet OC
   b. Sections With Multiple Openings: 20 feet OC.
4. Keep joint clear of mortar by temporarily filling with fiberboard as wall is laid.
5. Stop horizontal reinforcement I inch from expansion joints.
6. Build in expansion flashing as work progresses
7. Leave joint open and clean for caulking.
8. Install in the following locations:
   a. At corners.
   b. At pilasters
   c. At shelf angles.
   d. At offsets and backsets
   e. Where masonry elevations change.
   f. At exposed and concealed columns.
   g. Where masonry butts to dissimilar materials
   h. At junctures. Form according to the two-way design.

9. Horizontal Joints: As recommended by the BIA.
   a. Locate below each shelf angle

C. Control Joints
1. Build in rubber or neoprene control joints as work progresses. Ensure flange in joint filler is secured where joints occur in running walls.

2. Make joints 3/8 inch wide, unless indicated otherwise. Rake out control joint to a depth of 3/4 inch while mortar is still plastic.
3. Stop horizontal joint reinforcement 1 inch from control joints
4. Install joints in the following locations unless indicated otherwise:
    a. Running walls expressed as a ratio of panel length to height. With
        1) No Reinforcing: 1.25 to 1; Maximum distance between joints is 24 feet 8 inches
        2) Reinforcing Spaced 16 Inches oc Vertically: 1.87 to 1; Maximum distance between joints is 37 feet 4 inches
        3) Reinforcing Spaced 8 Inches oc Vertically: 2.5 to 1; Maximum distance between joints is 44 feet 8 inches
    b. Structural columns
    c. Changes in wall thickness
    d. Abrupt changes in wall height
    e. Intersections of concrete walls
    f. Intersecting masonry walls of which either one is more than 10 feet long.
    g. Joint between masonry and structural slabs, beams or decks.

D. Fill joints with backer rod and polyurethane sealant.

## 3.6 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

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

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

## 3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:

1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.

3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

## 3.8 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.
2. Space weep holes 24 inches o.c. unless otherwise indicated.
3. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.

D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

E. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

## 3.9 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar

and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

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

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

B. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

C. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.

D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

E. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.11 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Protect surfaces from contact with cleaner.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.

4. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.12 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches of finished grade.

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

END OF SECTION 042000

# SECTION 042613 – MASONRY VENEER

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

B. Refer to **Specification 042000 – UNIT MASONRY**

### 1.2 SUMMARY

A. Section Includes:
1. Clay face brick.
2. Mortar.
3. Ties and anchors.
4. Embedded flashing.
5. Miscellaneous masonry accessories.

B. Products Installed but not Furnished under This Section:
1. Steel lintels in masonry veneer.
2. Steel shelf angles for supporting masonry veneer.

C. Related Requirements:
1. Section 076200 "Sheet Metal Flashing and Trim" for sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

### 1.4 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

### 1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site**.

### 1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

C. Shop Drawings: For the following:

1. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

D. Samples for Initial Selection:

1. Clay face brick, in the form of straps of five or more bricks.
2. Colored mortar.
3. Weep holes/vents.

E. Samples for Verification: For each type and color of the following:

1. Clay face brick, in the form of straps of five or more bricks.
2. Colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
3. Weep holes and vents.
4. Accessories embedded in masonry.

1.7 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Material Certificates: For each type and size of the following:

1. Masonry units.
   a. Include data on material properties material test reports substantiating compliance with requirements.
   b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
   c. For exposed brick, include test report for efflorescence according to ASTM C 67.
2. Mortar admixtures.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.

D. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.8 QUALITY ASSURANCE

A. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.

1. Build sample panels for typical exterior wall in sizes approximately 48 inches (1200 mm) long by 48 inches (1200 mm) high by full thickness.
2. Build sample panels facing south.
3. Where masonry is to match existing, build panels adjacent and parallel to existing surface.
4. Clean one-half of exposed faces of panels with masonry cleaner indicated.
5. Protect approved sample panels from the elements with weather-resistant membrane.
6. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical wall area as shown on **Drawing A520**.
2. Build mockups for typical exterior wall in sizes approximately 48 inches (1200 mm) long by 48 inches (1200 mm) high by full thickness, including face and backup wythes and accessories.
    a. Include a sealant-filled joint at least 16 inches (400 mm) long in mockup.
    b. Include lower corner of window opening at upper corner of exterior wall mockup. Make opening approximately 12 inches (300 mm) wide by 16 inches (400 mm) high.
    c. Include through-wall flashing installed for a 24-inch (600-mm) length in corner of exterior wall mockup approximately 16 inches (400 mm) down from top of mockup, with a 18-inch (450-mm) length of flashing left exposed to view (omit masonry above half of flashing).
    d. Include metal studs, sheathing, water-resistive barrier sheathing joint-and-penetration treatment air barrier, veneer anchors, flashing, cavity drainage material, and weep holes in exterior masonry-veneer wall mockup.
4. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
5. Protect accepted mockups from the elements with weather-resistant membrane.
6. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

    a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
    b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.10 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of veneer, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches (600 mm) down face of veneer, and hold cover securely in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry. Immediately remove grout, mortar, and soil that come in contact with masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 BRICK

B. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

C. Clay Face Brick: Facing brick complying with ASTM C 216, type FBS, Grade SW and as follows:

**1. Unit Compressive Strength: Specify units with minimum average net-area compressive strength of 3000 psi.**
**2. 24-Hour Cold Water Absorption: Does not exceed 8.0%.**
**3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."**
4. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers, or Architect approved equal prior to Bid, offering products that may be incorporated into the Work include, but are not limited to, the following:
   **a. Product Representative**
   **North Georgia Brick**
   **Jamie Hustey**
   **404-989-1489**
   **jhustey@ngabrick.com**
   **b. Product**
   **As indicated on Architectural Drawing A520**
   **Exterior Keynote Schedule**

5. Size (Actual Dimensions): **To match existing brick in size and texture.**

2.6 MORTAR MATERIALS

B. **Provide the following:**
1. **Masonry Cement meeting ASTM C 91**
   a. **For pigmented mortars, only allow premixed, colored masonry cements of formulation required to produce color desired. Pigments shall not exceed 5 percent of masonry cement by weight for mineral oxides nor 1 percent for carbon black.**
2. **Hydrated Lime: ASTM C 207, Type S.**
3. **Portland Cement-Lime Mix: Packaged blend of Portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.**
4. **Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch (6.5 mm), use aggregate graded with 100 percent passing the No. 16 (1.18 mm) sieve.**
5. **Aggregate for Grout: ASTM C 404.**
6. **Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified in this Article; combined with set-controlling admixtures to produce a ready-mixed mortar complying with ASTM C 1142.**
7. **Water: Potable.**
8. **Products: Colored Masonry Cement:**
   a. **At locations of specified face brick, use Type N mortar, color to be Argos Canyon Brown**

2.7 TIES AND ANCHORS

A. **Adjustable Masonry-Veneer Anchors:**
1. **General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.**
2. **Screw-Attached, Masonry-Veneer Anchors at metal stud framing:**
   a. **Basis of Design is HB-213-HS by Hohmann & Barnard, Inc.**
   b. **Wire tie section shall extend at least halfway through veneer but with at least 5/8-inch cover on outside face.**
   c. **Wire (carbon steel): Prefabricated from cold-drawn steel wire conforming to ASTM A82/A82M**
   d. **Tensile Strength: 80,000 p.s.i., Yield Point: 70,000 p.s.i. minimum**
   e. **Hot-dip Galvanized after fabrication: ASTM A153/A153M-B (1.5 oz/ft2)**
   f. **Space 16" on center horizontal and 16" on center vertical.**
   g. **Refer to Section 072100. Provide wall ties that aide in securing rigid insulation.**

3. **Screw-Attached, Masonry-Veneer Anchors at concrete:**
   a. **Basis of Design is HB-200 by Hohmann & Barnard, Inc.**
   b. **Wire tie section shall extend at least halfway through veneer but with at least 5/8-inch cover on outside face.**
   c. **Wire (carbon steel): Prefabricated from cold-drawn steel wire conforming to**

**ASTM A82/A82M**

**d. Tensile Strength: 80,000 p.s.i., Yield Point: 70,000 p.s.i. minimum**
**e. Hot-dip Galvanized after fabrication: ASTM A153/A153M-B (1.5 oz/ft2)**
**f. Space 16" on center horizontal and 16" on center vertical.**

**4. Masonry-Veneer Anchors at CMU:**
**a. Basis of Design is Lox-All Truss Reinforcement #170 Truss Eye-Wire by Hohmann & Barnard, Inc.**
**b. Wire tie section shall extend at least halfway through veneer but with at least 5/8-inch cover on outside face.**
**c. Conforms to ASTM A951/A951M-06, ACI/ASCE 530 and ASTM A82/A82M**
**d. Tensile Strength: 80,000 p.s.i., Yield Point: 70,000 p.s.i. minimum e. Hot-dip Galvanized after fabrication: ASTM A153/A153M-B2 (1.5 oz/ft2)**
**e. Space 16" on center horizontal and 16" on center vertical.**

2.8 EMBEDDED FLASHING MATERIALS

A. Flexible Flashing:

1. Use the following unless otherwise indicated:

a. Basis-of-Design Product: Subject to compliance with requirements, provide Mortar Net Solutions; TotalFlash unitized flashing and cavity drainage system or comparable product by one of the following:

1) Advanced Building Products Inc.
2) Architect approved prior to Bid

b. Accessories: Provide preformed corners, end dams, and materials produced by flashing manufacturer.

1) Basis-of-Design Product: Mortar Net Solutions; CompleteFlash.

c. Sealants:

1) Basis-of-Design Product: Mortar Net Solutions; BTL-1, Butyl.

2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch (1.02 mm).

a. Basis-of-Design Product: Subject to compliance with requirements, provide Mortar Net Solutions; TotalFlash unitized flashing and cavity drainage system or comparable product by one of the following:

1) Advanced Building Products Inc.
2) Carlisle Coatings & Waterproofing Inc.
3) Fiberweb, Clark Hammerbeam Corp.
4) Grace Construction Products; W.R. Grace & Co. -- Conn.
5) Heckmann Building Products, Inc.

6) Polyguard Products, Inc.
7) W. R. Meadows, Inc.
8) Williams Products, Inc.

b. Accessories: Provide preformed corners and end dams produced by flashing manufacturer.

1) Basis-of-Design Product: Mortar Net Solutions; CompleteFlash.

c. Sealants:

1) Basis-of-Design Product: Mortar Net Solutions; MPE-1, Modified Polyether BTL-1, Butyl.

3. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a UV stable thermoplastic vinyl of an overall thickness of not less than 0.040 inch (1.02 mm).

a. Basis-of-Design Product: Subject to compliance with requirements, provide Mortar Net Solutions; TotalFlash unitized flashing and cavity drainage system or comparable product by one of the following:

1) Advanced Building Products Inc.
2) Hyload, Inc.
3) Or Architect approved prior to Bid

b. Self-Adhesive Sheet: Flexible 40 mil (1 mm) self-adhering sheet membrane, consisting of a self-adhered rubberized asphalt, a removable treated release film, and a high density 8 mil (0.2 mm) polymer film as the top surface.

c. Self-Adhesive Sheet with Drip Edge: Flexible 40 mil (1 mm) self-adhering sheet membrane, consisting of a self-adhered rubberized asphalt with drip edge. Where flashing extends to face of masonry, rubberized-asphalt coating is held back approximately 3/4 inches (19 mm) from edge.

d. Accessories: Provide preformed corners and end dams produced by flashing manufacturer.

1) Basis-of-Design Product: Mortar Net Solutions; CompleteFlash.

e. Sealants:

1) Basis-of-Design Product: Mortar Net Solutions; MPE-1, Modified Polyether BTL-1, Butyl.

4. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637/D 4637M, 0.045 inch (1.14 mm) thick.

a. Basis-of-Design Product: Subject to compliance with requirements, provide Mortar Net Solutions; TotalFlash unitized flashing and cavity drainage system or comparable product by one of the following:

1) Carlisle Coatings & Waterproofing Inc.
2) Firestone Specialty Products.
3) Heckmann Building Products, Inc.
4) Architect approved prior to Bid

b. Accessories: Provide preformed corners and end dams produced by flashing manufacturer.

1) Basis-of-Design Product: Mortar Net Solutions; CompleteFlash.

c. Sealants:

1) Basis-of-Design Product: Mortar Net Solutions; MPE-1, Modified Polyether] BTL-1, Butyl.

B. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use a flexible flashing with a metal drip edge or elastomeric thermoplastic flashing with a drip edge.

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

D. Termination Bars for Flexible Flashing: [Aluminum] [Stainless steel] steel bars [0.075 inch by 1 inch (1.9 mm by 25 mm)] [1/8 inch by 1 inch (3 mm by 25 mm)].

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

F. Termination Bars for Flexible Flashing: Aluminum sheet 0.064 inch by 1-1/2 inches (01.6 mm by 38 mm) with a 3/8 inch (9.5 mm) sealant flange at top.

## 2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Weep/Vent Products: Use:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe, in color selected from manufacturer's standard.

a. Basis-of-Design Product: Subject to compliance, provide Mortar Net Solutions; CellVent or Architect approved prior to Bid:

**Cell Vents: Ultra Violet Resistant Polypropylene cell vent tested in conformance with ASTM D2240, D790B, D638 and D1238B.**

**i. Basis of Design is Quadro-Vent by Hohmann & Barnard, Inc.**
**ii. #3601 Cell Vent by Wire-bond.**
**iii. Mortar Net Weeps not allowed.**
**iv. Plastic tube weeps not allowed.**
**v. Cotton weeps not allowed.**
**vi. Color to be selected from standard color samples to match mortar.**
**vii. Space vents 24" on center horizontally placed in brick masonry joint. Vent to occur full height of joint. Cut vent as required to match brick height.**

C. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. **Basis-of-Design Product: Subject to compliance with requirements, provide Mortar Net Solutions; MortarNet with the following:**

**a. Provide trapezoidal shaped Mortar Net with insect barrier to suspend mortar droppings at unequal heights allowing moisture to drain from the cavity and maintain airflow within the cavity wall.**

**b. Shall have 90% open-weave mesh construction, shall not oxidize, rot,**

## 2.10 MASONRY CLEANERS

A. Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. **To satisfy the following:**
**a. Brick cleaning in accordance with BIA Technotes #20.**
**b. Cleaning solutions to be approved by the manufacturer to not damage the surface of the units.**
**c. Pressure washing is not allowed due to the potential damage to units and mortar joints.**
**d. The use of muriatic or hydrochloric acid is not allowed.**

## 2.11 MORTAR MIXES

A. **General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.**

1. **Do not use calcium chloride in mortar or grout.**

B. **Mortar for Unit Masonry: Comply is to comply with BIA M1, for types of mortar indicated below:**

1. **For masonry below grade, in contact with earth, use Type S mortar.**
2. **For reinforced masonry, use Type S mortar.**
3. **For exterior, above-grade, load-bearing and non-load bearing walls; for interior load-bearing walls; for interior non-load bearing partitions, and for other applications, use Type N mortar.**
4. **Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required.**
5. **Grout for Unit Masonry: Comply with ASTM C 476.**
   a. **Use coarse grout in grout spaces 2 inches or more in least horizontal dimension.**
6. **Mortar joints shall be concave, unless otherwise directed by the County.**

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 INSTALLATION, GENERAL

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

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

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

D. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

E. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm) except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch (1.5 mm) from one masonry unit to the next.

## 3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in **running bond** ; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

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

## 3.5 MORTAR BEDDING AND JOINTING

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

B. Lay hollow brick and CMUs with face shells fully bedded in mortar and with head joints of depth equal to bed joints. At starting course, fully bed entire units, including area under cells.

1. At anchors and ties, fully bed units and fill cells with mortar as needed to fully embed anchors and ties in mortar.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

1. For glazed masonry units, use a nonmetallic jointer 3/4 inch (19 mm) or more in width.

## 3.6 ANCHORED MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete and masonry backup with seismic masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached and seismic anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed tie sections connector sections and continuous wire in masonry joints.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally, with not less than one anchor for each 2 sq. ft. (0.2 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 8 inches (203 mm), around perimeter.

B. Provide not less than 2 inches (50 mm) of airspace between back of masonry veneer and face of sheathing insulation.

1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

## 3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete to comply with the following:

1. Provide an open space not less than 2 inches (50 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

## 3.8 EXPANSION JOINTS

A. General: Install expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints as follows:

1. Build in compressible joint fillers where indicated.
2. Form open joint full depth of brick wythe and of width indicated, but not less than 1/2 inch (13 mm) for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."

C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch (10 mm).

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

## 3.9 LINTELS

A. Install **galvanized steel lintels** above all exterior exposed openings. **Paint all lintel surfaces prior to installation with special paint that adheres to galvanized steel on all surfaces.**

B. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.10 FLASHING, WEEP HOLES, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. Extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches (200 mm); with upper edge tucked under water-resistive barrier air barrier, lapping at least 4 inches (100 mm). Fasten upper edge of flexible flashing to sheathing through termination bar.
3. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
5. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

D. Install weep holes in veneers in head joints of first course of masonry immediately above embedded flashing.

1. Use specified weep/vent products to form weep holes.
2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.

E. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

C. Testing Prior to Construction: One set of tests.

D. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.

## 3.12 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
7. Clean stone trim to comply with stone supplier's written instructions.
8. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

## 3.13 MASONRY WASTE DISPOSAL

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

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

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

END OF SECTION 042113

# SECTION 051000 - STRUCTURAL STEEL FRAMING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes structural steel.

### 1.2 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC's "Manual of Steel Construction" Part 9-12.

### 1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication of structural-steel components.

C. Welding certificates.

D. Mill test reports.

E. Source quality-control test reports.

### 1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category Sbd.

B. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

C. Comply with applicable provisions of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992.

B. Channels, Angles-Shapes: ASTM A 36.

C. Plate and Bar: ASTM A 36.

D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.

F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

B. Unheaded Anchor Rods: ASTM F 1554, Grade 36.

1. Configuration: Hooked.
2. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

C. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

D. Threaded Rods: ASTM A 36.

1. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

2.3 PRIMER

A. Primer: SSPC-Paint 25, Type II, iron oxide, zinc oxide, raw linseed oil, and alkyd.

B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

2.4 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings"

2.5 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, u.n.o.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

2.6 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials.
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.7 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports. Comply with testing and inspection requirements of Part 3, Article "Field Quality Control."

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding.

## PART 3 - EXECUTION

### 3.1 ERECTION

A. Examination: Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.

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

B. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings"

C. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.

1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of base plate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

D. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

### 3.2 FIELD CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, u.n.o.

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 051000

# SECTION 053100 - STEEL DECK

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:

1. Roof deck.

2. Floor deck.

### 1.2 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Include layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.

C. Product certificates.

D. Welding certificates.

E. Research/evaluation reports.

### 1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

B. Fire-Test-Response Characteristics: Provide roof deck which is listed in "Factory Mutual Approval Guide" for "Class I" fire rated construction.

C. AISI Specifications: Calculate structural characteristics of steel deck according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members."

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. BHP Steel Building Products USA Inc.

2. Consolidated Systems, Inc.
3. Epic Metals Corp.
4. Marilyn Steel Products, Inc.
5. Nucor Corp.; Vulcraft Div.
6. Roof Deck, Inc.
7. United Steel Deck, Inc.
8. Verco Manufacturing Co.
9. Wheeling Corrugating Co.; Div. of Wheeling-Pittsburgh Steel Corp.

2.2 ROOF DECK

A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 29.
   1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
   2. Deck Profile: See plans.
   3. Profile Depth: See plans.
   4. Design Uncoated-Steel Thickness: See plans.

2.3 NONCOMPOSITE FORM DECK

A. Noncomposite Steel Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 30, with the minimum section properties indicated, and with the following:

   1. Uncoated Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 minimum.

   2. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.

   3. Profile Depth: See plans.
   4. Design Uncoated-Steel Thickness: See plans.
   5. Span Condition: Triple span or more.
   6. Side Laps: Interlocking seam.

2.4 COMPOSITE FLOOR DECK

1. See plans for floor deck specifications.

2.5 ACCESSORIES

A. Accessories: Steel deck manufacturer's standard accessory materials, including mechanical fasteners, closure strips, pour stops, and closures for deck.

B. Galvanizing Repair Paint: ASTM A 780.

C. Repair Paint: Lead- and chromate-free rust-inhibitive primer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 29, manufacturer's written instructions, and requirements in this Section.

B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to decking.

E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.

F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

G. Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

H. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.

I. Repairs and Protection:

1. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
2. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

3.2 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing agency to perform field quality-control testing.

B. Field welds will be subject to inspection.

C. Remove and replace work that does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

END OF SECTION 05310

# SECTION 054000 - COLD-FORMED METAL FRAMING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Exterior and interior non-load-bearing, curtain-wall framing.

### 1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads without deflections greater than the following:
   1. Exterior Non-Load-Bearing, Curtain-Wall Framing: Horizontal deflection of 1/240 of the wall height.

### 1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Include layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners.

### 1.4 QUALITY ASSURANCE

A. Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold-formed metal framing.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Dietrich Industries, Inc.
   2. MarinoWare; Div. of Ware Industries, Inc.
   3. Super Stud Building Products, Inc.
   4. Unimast, Inc.
   5. United Metal Products, Inc.
   6. Western Metal Lath.

2.2 MATERIALS

A. Steel Sheet: ASTM A 653/A 653M, structural steel, G60 zinc coating, Grade 33 for minimum uncoated steel thickness of 0.0428 inch and less; Grade 50 for minimum uncoated steel thickness of 0.0538 inch and greater.

B. Wall Framing: Manufacturer's standard steel studs, of web depths and gage indicated, with stiffened flanges, complying with ASTM C 955.
   1. Track: Manufacturer's standard U-shaped steel track, unpunched, with straight flanges, complying with ASTM C 955, manufacturer's standard flange width, and minimum uncoated-steel thickness matching steel studs.

2.3 ACCESSORIES AND MISCELLANEOUS MATERIALS

A. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi, of manufacturer's standard thickness and configuration, unless otherwise indicated.

B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.

C. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

D. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to ASTM C 1007, manufacturer's written recommendations, and requirements in this Section.

   1. Cut framing members by sawing or shearing; do not torch cut.
   2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
   3. Install framing members in one-piece lengths.
   4. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed.
   5. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
   6. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

B. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

C. Non-Load-Bearing, Curtain-Wall Installation: Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure. Space studs as indicated; set plumb, align, and fasten both flanges of studs to track, unless otherwise indicated.

1. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
2. Install horizontal bridging in curtain-wall studs, spaced in rows indicated on Shop Drawings but not more than 54 inches apart. Fasten at each stud intersection.
3. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtain-wall-framing system.

D. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

END OF SECTION 054000

# SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Wood blocking and nailers.
   2. Wood furring and grounds.
   3. Utility shelving.
   4. Plywood backing panels.

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

### 1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

   1. Preservative-treated wood.
   2. Fire-retardant-treated wood.
   3. Power-driven fasteners.

## PART 2 - PRODUCTS

### 2.1 WOOD PRODUCTS, GENERAL

A. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

### 2.2 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.

   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. For exposed lumber indicated to receive stained or natural finish, mark grade stamp on end or back of each piece.
   3. Provide dressed lumber, S4S, unless otherwise indicated.
   4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

B. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable Design Stresses: Meet or exceed those indicated per manufacturer's published values determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

C. Wood Structural Panels:

1. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.
2. Oriented Strand Board: DOC PS 2.
3. Comply with "Code Plus" provisions in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial."

## 2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawl spaces or unexcavated areas.

## 2.4 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20

minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
3. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

C. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

D. Application: Treat items indicated on Drawings, and the following:

1. Framing for raised platforms.
2. Concealed blocking.
3. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
4. Plywood backing panels.

## 2.5 DIMENSION LUMBER

A. General: Of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.

B. Non-Load-Bearing Interior Partitions: Construction, Stud, or No. 2 grade and any of the following species:

1. Mixed southern pine; SPIB.
2. Eastern softwoods; NELMA.
3. Northern species; NLGA.
4. Western woods; WCLIB or WWPA.

C. Framing Other Than Non-Load-Bearing Partitions: As noted on structural drawings.

1. Species and Grade: #2 SPF or better

D. Exposed Framing: Hand select material for uniformity of appearance and freedom from characteristics that would impair finish appearance.

1. Species and Grade: #2 SPF or better

2.6 TIMBER AND MISCELLANEOUS LUMBER

A. For timbers of 5-inch nominal size and thicker, provide material complying with the following requirements: As noted on structural drawings

B. Provide miscellaneous lumber for support or attachment of other construction, including the following:

1. Rooftop equipment bases and support curbs.
2. Blocking.
3. Cants.
4. Nailers.
5. Furring.
6. Grounds.

C. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 19 percent maximum moisture content of any species.

D. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Eastern softwoods, No. 2 Common grade; NELMA.
3. Northern species, No. 2 Common grade; NLGA.
4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

2.7 ENGINEERED WOOD PRODUCTS

A. Laminated-Veneer Lumber: Composite of wood veneers with grain primarily parallel to member lengths, manufactured with exterior-type adhesive complying with ASTM D 2559. Allowable design values determined according to ASTM D 5456.

1. Available Manufacturers:

a. Boise Cascade Corporation.
b. Georgia-Pacific Corporation.
c. Louisiana-Pacific Corporation.
d. Pacific Woodtech Corp.
e. Trus Joist MacMillan.
f. Union Camp Corp.; Building Products Division.
g. Willamette Industries, Inc.

2. Extreme Fiber Stress in Bending, Edgewise: 2850 psi for 12-inch nominal- depth members.
3. Modulus of Elasticity, Edgewise: 2,000,000 psi.

2.8 SHEATHING

A. Plywood Wall Sheathing: Exterior, Structural I sheathing.

B. Oriented-Strand-Board Wall Sheathing: Exposure 1, Structural I sheathing.

C. Fiberboard Wall Sheathing: AHA A194.1, Type IV, Class 1 (regular density) cellulosic fiberboard sheathing with square edges, 1/2 inch thick.

D. Paper-Surfaced Gypsum Wall Sheathing: ASTM C 79/C 79M, with water-resistant material incorporated into core and with water-repellent paper bonded to core's face, back, and long edges.

1. Available Manufacturers:

a. American Gypsum Co.
b. G-P Gypsum Corporation.
c. National Gypsum Company.
d. United States Gypsum Co.

2. Type and Thickness: Type X, 5/8 inch thick.

E. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/C 1177M.

1. Product: Subject to compliance with requirements, provide "Dens-Glass Gold" by G-P Gypsum Corp.
2. Type and Thickness: Regular, 1/2 inch thick.

F. Plywood Roof Sheathing: Exterior, Structural I sheathing.

## 2.9 PLYWOOD BACKING PANELS

## 2.10 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Furring.
4. Utility shelving.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.

C. For utility shelving, provide lumber with 15 percent maximum moisture content of eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or No. 2 Common (Sterling) grade; NeLMA, NLGA, WCLIB, or WWPA.

D. For concealed boards, provide lumber with 15 19 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Eastern softwoods, No. 2 Common grade; NELMA.
3. Northern species, No. 2 Common grade; NLGA.

2.11 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.12 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

B. Power-Driven Fasteners: NES NER-272.

C. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.

2.13 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Self-adhesive butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit.

B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

E. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

F. Securely attach carpentry work to substrate by anchoring and fastening complying with the following:

1. NES NER-272 for power-driven fasteners.

2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

# SECTION 061600 - SHEATHING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

### 1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated plywood.
2. Fire-retardant-treated plywood.

### 1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

### 1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

### 2.2 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat all plywood unless otherwise indicated.

### 2.3 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201/D 3201M at 92 percent relative humidity. Use where exterior type is not indicated.
3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D 5516 and design value adjustment factors shall be

calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

E. Application: Treat plywood as indicated on Drawings.

2.4 WALL SHEATHING

A. Fiberglass Mat Gypsum Sheathing: Exterior, Non combustible. **Basis of design: Georgia Pacific DensGlass Gold**

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Georgia Pacific
b. National Gypsum.
c. United States Gypsum Company.
d. Approved equal prior to bid.

2. Thickness: As indicated.

B. Plywood Sheathing: Exterior soffits and fascia as noted on construction drawings. Structural I sheathing. **Fire rated**

2.5 ROOF AND PARAPET SHEATHING

A. Plywood Sheathing: Exterior, Structural I sheathing. **Fire rated**

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof, and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

2.7 WOOD PANEL PRODUCTS

A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

B. Factory mark panels to indicate compliance with applicable standard.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

D. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

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

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:

a. Nail to wood framing.
b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 061600

# SECTION 062000 – FINISH CARPENTRY

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Interior Trim

B. Finish carpentry items

C. **Exterior Benches**

### 1.2 RELATED REQUIREMENTS

A. Product Data: For each type of process and factory-fabricated product.

B. Samples: For each type.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical treatment manufacturer's written instructions for finishing treated material.
2. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

C. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.

### 1.4 INFORMATIONAL SUBMITTALS

A. Compliance Certificates:

1. For lumber that is not marked with grade stamp.
2. For preservative-treated wood that is not marked with treatment-quality mark.
3. For fire-retardant-treated wood that is not marked with classification marking of testing and inspecting agency.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Cellular PVC trim.
4. Foam plastic moldings.

C. Sample Warranties: For manufacturer's warranties.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

B. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

C. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.

1. For exterior ornamental wood columns, comply with manufacturer's written instructions and warranty requirements.

B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20.

1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

    a. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.

B. Softwood Plywood: DOC PS 1.

C. Hardboard: AHA A135.4.

D. MDF: ANSI A208.2, Grade 130 .

E. Particleboard: ANSI A208.1, Grade M-2.

F. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

    1. Color: As selected by Architect from manufacturer's full range.

## 2.2 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

    1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent respectively.

B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

    1. For exposed lumber and plywood indicated to receive a stained or natural finish, mark back of each piece.

C. Application: Where indicated.

## 2.3 INTERIOR TRIM

A. Hardwood Lumber Trim **(painted wall base)**:

    1. Species and Grade: **WD-1 (see finish schedule on sheet I110)**; Clear; NHLA.
    2. Maximum Moisture Content: 13 percent.

B. Hardwood Moldings for Transparent Finish (Clear Finish): WMMPA HWM 2, N-grade wood moldings made to patterns included in WMMPA HWM 1.

1. Species: **WD-1 (see finish schedule on sheet I110)**.
2. Maximum Moisture Content: 9 percent.

C. Moldings for Opaque Finish (Painted Finish): Made to patterns included in WMMPA WM 12.

1. Hardwood Moldings: WMMPA HWM 2, P-grade.

a. Species: **WD-1 (see finish schedule on sheet I110)**.
b. Maximum Moisture Content: 9 percent.

D. Molding Patterns:

1. Base Pattern: **As indicated on drawings.**
2. Shoe-Mold Pattern: **Not used.**
3. Chair-Rail Pattern: **Not used**.

2.4 PANELING

A. Hardwood Veneer Plywood Paneling: Manufacturer's stock hardwood plywood panels complying with HPVA HP-1. **WD-1 (see finish schedule on sheet I110)**

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Chesapeake Hardwood Products, Inc.
2. Georgia-Pacific Building Products.
3. Holland Southwest International.

C. Board Paneling:

1. Species and Grade: **WD-1 (see finish schedule on sheet I110)**; NeLMA, NLGA, or WWPA.
2. Maximum Moisture Content: 15 percent.

2.5 SHELVING

A. Shelving: Made from following materials, 3/4 inch thick.
4. Hardwood Boards **(Exposed to View)**: **WD-1**; NLGA, WCLIB, or WWPA;; SPIB; kiln dried.

B. Shelf Brackets with Rod Support: BHMA A156.16, B04051; prime-painted formed steel.

**2.6 EXTERIOR BENCHES**

**A. Exterior Benches: WD-2, Made from the following materials, 3/4 inch thick.**

**1. IPE Boards (Exposed to View): IPE 2”x2”x 8 feet long; NLGA, WCLIB, or WWPA;; SPIB; kiln dried.**

2.7 MISCELLANEOUS MATERIALS

A. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

B. Paneling Adhesive: Comply with paneling manufacturer's written recommendations for adhesives.

**2.8 FINISH (FOR WD-1 – NATURAL LOOK)**

A. Grade: **No. 2 with exposed knots**. **Fill knots with black epoxy filler as required**
B. Finish: **Two coats 2000 Flat Water based Polyurethane.**
C. Staining: **Two coats natural sealer with whitener.**
D. Effect: **Open-grain finish.**
E. Sheen: **Satin.**

**2.9 FINISH (FOR WD-1 – PAINTED)**

A. Grade: **No. 2 with exposed knots**. **Fill knots with wood filler as required**
B. Finish: **Two coats paint**
C. Prime: **Prime base coat**
D. Effect: **Solid color**
E. Sheen: **Satin.**

**2.10 FINISH (FOR WD-1 – PAINT WASH FOR CHILDREN'S WOOD SHELVING)**

A. Grade: **No. 2 with exposed knots**. **Fill knots with wood filler as required**
B. Finish: **Two paint wash**
C. Prime: **None**
D. Effect: **Washed color look where see grain through wash**
E. Sheen: **Satin.**

**2.11 FINISH (FOR WD-2)**

A. Grade: **No. 1**.
B. Finish: **Two coats Messmer's U.V. Plus Natural for wood decks.**
C. Staining: **None.**
D. Effect: **Open-grain finish.**
E. Sheen: **Natural.**

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.2 INSTALLATION, GENERAL

A. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Countersink fasteners, fill surface flush, and sand unless otherwise indicated.
3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
4. Install stairs with no more than 3/16-inch variation between adjacent treads and risers and with no more than 3/8-inch variation between largest and smallest treads and risers within each flight.

3.3 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.

3.4 PANELING INSTALLATION

A. Plywood Paneling: Select and arrange panels on each wall to minimize noticeable variations in grain character and color between adjacent panels. Leave 1/4-inch gap to be covered with trim at top, bottom, and openings. Install with uniform tight joints between panels.

1. Attach panels to supports with manufacturer's recommended panel adhesive and fasteners. Space fasteners and adhesive as recommended by panel manufacturer.
2. Conceal fasteners to greatest practical extent.

B. Hardboard Paneling: Install according to manufacturer's written recommendations. Leave 1/4-inch gap to be covered with trim at top, bottom, and openings. Butt adjacent panels with moderate contact. Use fasteners with prefinished heads matching paneling color.

C. Board Paneling: Arrange in random-width pattern suggested by manufacturer unless boards or planks are of uniform width.

1. Install in full lengths without end joints.
2. Stagger end joints in random pattern to uniformly distribute joints on each wall.
3. Select and arrange boards on each wall to minimize noticeable variations in grain character and color between adjacent boards. Install with uniform tight joints between boards.
4. Fasten paneling by face nailing, setting nails, and filling over nail heads.
5. Fasten paneling with trim screws, set below face and filled.
6. Fasten paneling by blind nailing through tongues.

3.5 SHELVING

A. Cut shelf cleats at ends of shelves about 1/2 inch less than width of shelves and sand exposed ends smooth.

B. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled. Space fasteners not more than 16 inches o.c.

C. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on cleats, brackets, and supports.

END OF SECTION 062023

# SECTION 064113 – ARCHITECTURAL MILLWORK

## PART 1 - . GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing architectural cabinets that are not concealed within other construction.
3. Shop finishing of architectural cabinets.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.

### 1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Section 087111 "Door Hardware" to manufacturer of architectural cabinets; coordinate Shop Drawings and fabrication with hardware requirements.

### 1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site**.

### 1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

C. Shop Drawings: For architectural cabinets.

1. Include plans, elevations, sections, and attachment details.
2. Show **large-scale** details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in architectural cabinets.
5. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
6. Apply **AWI Quality Certification** or **WI Certified Compliance** Program label to Shop Drawings.

D. Samples: For each exposed product and for each color and finish specified, in manufacturer's standard size.

E. Samples for Initial Selection: For each type of exposed finish.

F. Samples for Verification: For the following:

1. Lumber for Transparent Finish: Not less than **5 inches (125 mm) wide by 12 inches (300 mm) long** for each species and cut, finished on one side and one edge.
2. Veneer Leaves: Representative of and selected from flitches to be used for transparent-finished cabinets.
3. Lumber and Panel Products with Shop-Applied Opaque Finish: **5 inches (125 mm) wide by 12 inches (300 mm)** long for lumber and **12 by 12 inches (300 by 300 mm)** for panels, for each finish system and color.

    a. Finish **entire** exposed surface.

4. Thermoset Decorative Panels: **12 by 12 inches (300 by 300 mm)**, for each color, pattern, and surface finish.

    a. Provide edge banding on one edge.

5. Corner Pieces:

    a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by 6 inches (150 mm) deep.
    b. Miter joints for standing trim.

6. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For **manufacturer and Installer**.

B. Product Certificates: For **the following:**

1. Composite wood and agrifiber products.
2. Thermoset decorative panels.
3. Glass.
4. Adhesives.

C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

D. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: **AWI Quality Certification Program** or **WI Certified Compliance Program** certificates.

1.8 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Manufacturer's Certification: Licensed participant in **AWI's Quality Certification Program** or **WI's Certified Compliance Program**].

B. Hardware Manufacturer Qualifications: A manufacturer capable of fabricating hardware that meets or exceeds performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.

1. Manufacturer to have ISO 9001 quality management system registration.

C. Installer Qualifications: **Licensed participant in AWI's Quality Certification Program** or **Licensed participant in WI's Certified Compliance Program**.

**1. Any firm producing architectural woodwork must document 5 years of experience with a record of successful in-service performance, as well as sufficient production capacity to produce required units specified in the documents.**

**2. The qualified woodworking firm shall assume undivided responsibility for fabricating, finishing, and installing woodwork specified.**

D. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of **typical architectural cabinets as shown on Drawings**. **Specifically finger pull on cabinets.**
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between **25 and 55** percent during the remainder of the construction period.

C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.11 WARRANTY

A. Hardware Manufacturer's Warranty: Manufacturer agrees to replace hardware components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Limited Lifetime from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CABINET MANUFACTURERS

A. Source Limitations: Engage a qualified woodworking firm to assume responsibility for production of architectural cabinets with sequence-matched wood veneers **wood paneling**, **wood doors with face veneers that are sequence matched with architectural cabinets and transparent-finished wood doors that are required to be of same species as architectural cabinets**.

2.2 CABINETS, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of architectural cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide **labels and certificates** from **AWI** or **WI** certification program indicating that woodwork **and installation** complies with requirements of grades specified.

a. This project has been registered with AWI as AWI Quality Certification Program Number <**Insert number**>.

2. The Contract Documents contain requirements that are more stringent than the referenced woodwork quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

2.3 WOOD CABINETS FOR TRANSPARENT FINISH

A. Architectural Woodwork Standards Grade: **Custom**.

F. Type of Construction: **Refer to Drawings.**

G. Door and Drawer-Front Style: **Flush overlay.**

H. Wood for Exposed Surfaces: **As indicated on Drawings.**

1. Species: **WD-1 and WD-3 (see finish schedule on sheet I110).**
2. Blueprint Matching: Comply with veneer and other matching requirements indicated for blueprint-matched paneling.
3. Cut: **Plain sliced. Alternate stripes on wood to create a vertical stripe pattern.**
4. Grain Direction: **Vertically for drawer fronts, doors, and fixed panels**.
5. Matching of Veneer Leaves: **Random** match.
6. Veneer Matching within Panel Face: **Running** match.
7. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.

I. Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: **Same species and cut indicated for exposed surfaces**.
2. Drawer Subfronts, Backs, and Sides: **Solid-hardwood lumber, stained to match species indicated for exposed surfaces**
3. Drawer Bottoms: **Hardwood plywood**.

J. Dust Panels: 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers unless located directly under tops.

K. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with **glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints**.

2.4 WOOD CABINETS FOR OPAQUE FINISH

A. Architectural Woodwork Standards Grade: **Custom**.

G. Type of Construction: **Frameless**.

H. Door and Drawer-Front Style: **Flush overlay**.

I. Species for Exposed Lumber Surfaces: Any closed-grain hardwood.

J. Panel Product for Exposed Surfaces: **Hardwood plywood**.

K. Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: **Match materials indicated for exposed surfaces**.

a. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.

2. Drawer Sides and Backs: **Solid-hardwood lumber**.
3. Drawer Bottoms: **Hardwood plywood**.

L. Dust Panels: 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers unless located directly under tops.

M. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with **glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints**.

2.5 WOOD MATERIALS

A. **General:**

**1. All materials shall comply with requirements of the AWI quality standard for each type of woodwork and quality grade.**

**2. Provide Medium-Density Fiberboard: ANSI A208.2 (latest edition), Grade MD-Exterior Glue. No exposed, unfinished MDF surfaces. All MDF surfaces must be painted or veneer.**

**3. Provide ¾ in. exterior grade plywood at sinks and wet locations**

**4. Provide High-Pressure Decorative Laminate: NEMA LD-3 (latest edition), grades as required by woodwork quality standard.**

**5. Solid-Surfacing Material shall be homogeneous solid sheets of filled plastic resin complying with ISSFA-2.**

**6. The interior of all Custom grade cabinetry shall be white melamine.**

B. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.
2. Wood Moisture Content: **4 to 9** percent.

C. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

E. Composite Wood Products: Formaldehyde emission rates shall not be greater than the following when tested in accordance with ASTM D6007 or ASTM E1333:

1. Hardwood Plywood: 0.05 ppm.
2. Particleboard: 0.09 ppm.
3. MDF More Than 5/16 Inch (8 mm) Thick: 0.11 ppm.
4. MDF 5/16 Inch (8 mm) or Less in Thickness: 0.13 ppm.

F. Composite Wood Products: Products shall be made without urea formaldehyde.

1. MDF: ANSI A208.2, **Grade 130**.
2. Particleboard: ANSI A208.1, [**Grade M-2**] [**Grade M-2-Exterior Glue**].
3. Particleboard: Straw-based particleboard complying with requirements in ANSI A208.1, Grade M-2, except for density.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Environ Biocomposites Manufacturing LLC.
        2) Sorm Incorporated.
        3) Architect approved equal prior to Bid.

4. Softwood Plywood: DOC PS 1, **medium-density overlay**.

5. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
6. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.6 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.

1. Kiln-dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
2. For items indicated to receive a stained or natural finish, use organic resin chemical formulation.
3. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking shop certified by testing and inspecting agency.
4. Mill lumber before treatment and implement procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of architectural cabinets.

C. Fire-Retardant Particleboard: Made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Flakeboard Company Limited.
b. SierraPine.
c. Architect approved equal prior to Bid.

2. For panels 3/4 inch (19 mm) thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: modulus of rupture, 1600 psi (11 MPa); modulus of elasticity, 300,000 psi (2070 MPa); internal bond, 80 psi (550 kPa); and screw-holding capacity on face and edge, 250 and 225 lbf (1100 and 1000 N), respectively.
3. For panels 13/16 to 1-1/4 inches (20 to 32 mm) thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: modulus of rupture, 1300 psi (9 MPa); modulus of elasticity, 250,000 psi (1720 MPa); linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf (1100 and 780 N), respectively.

D. Fire-Retardant Fiberboard: MDF panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Panel Source International, Inc.
    b. SierraPine.
    c. Architect approved equal prior to Bid.

## 2.7 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087111 "Door Hardware".

1. Basis-of-Design Product: Subject to compliance with requirements, provide Grass America Inc.; Cabinet hardware and accessories or comparable product by one of the following:

    a. Accuride International.
    b. Blum, Julius & Co., Inc.
    c. CompX International, Inc.
    d. Hettich America L.P.
    e. Knape & Vogt Manufacturing Company.
    f. Architect approved equal prior to Bid.

B. **Frameless** Concealed Hinges (European Type): ANSI/BHMA A156.9, Grade 2, B01602, **170** degrees of opening**, self-closing, soft-closing**.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Grass America Inc.; [**Tiomos**] [**Nexis**] frameless hinge system or comparable product.
2. Overlays: [**Full**] [**Overlay**] [**Half**] [**Inset**].
3. Cup Assembly: [**Screw-on**] [**Tool-free application**] [**Dowelled**].
4. Material: **Nickel-plated steel**.
5. Cup Diameter: 1.38 inch (35mm).
6. Cup Depth: [**0.39 inch (10 mm)**] [**0.43 inch (10.8 mm)**] [**0.46 inch (11.8 mm)**] [**0.5 inch (12.6 mm)**] [**0.52 inch (13.2 mm)**].

E. Closer Adapters: Non-handed; mounted independent of hinge; used for face-frame cabinet doors on all overlays and for full-overlay frameless cabinet doors.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Grass America Inc.; Unisoft Soft-Close System or comparable product.

F. Side-Mounted Drawer Slides: ANSI/BHMA A156.9, Grade 1.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Grass America Inc.; **Ball-Bearing Slide** or comparable product.
2. Grade 1: Side mounted **and extending under bottom edge of drawer**.

    a. Type: **Full** extension.
    b. Material: **Galvanized cold-rolled steel with steel ball-bearings**.
    c. Load Capacity: **75 lb (34 kg)**.

3. Grade 1: Side mounted; full-extension type; zinc-plated steel, ball-bearing slides.
4. Drawers:

    a. Grade 1: 3 inches (75 mm) high and 24 inches (600 mm) wide or less.
    b. Grade 1: 3 to 6 inches (75 to 150 mm) high and 24 inches (600 mm) wide or less.
    c. Grade 1: 6 inches (150 mm) or higher, or 24 inches (600 mm) wide or wider.

5. Computer Keyboard Shelves: Grade 1.
6. Trash Bins: Grade 1; 20 inches (500 mm) high and 16 inches (400 mm) wide or less.

G. Undermount Drawer Slides: ANSI/BHMA A156.9, Grade 1.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Grass America Inc.; [**Dynapro**] [**Elite Plus**] [**Maxcess**] or comparable product.
2. Grade 1: Side mounted **and extending under bottom edge of drawer**.

    a. Type: **Full** extension.
    b. Material: Galvanized cold-rolled steel.
    c. Load Capacity: **75 lb (34 kg)**.

3. Drawers:

    a. Grade 1: 3 inches (75 mm) high and 24 inches (600 mm) wide or less.
    b. Grade 1: 3 to 6 inches (75 to 150 mm) high and 24 inches (600 mm) wide or less.
    c. Grade 1: 6 inches (150 mm) or higher, or 24 inches (600 mm) wide or wider.

4. Computer Keyboard Shelves: Grade 1.
5. Trash Bins: Grade 1; 20 inches (500 mm) high and 16 inches (400 mm) wide or less.

H. Opening Systems: Mechanical opening system.
3. Drawers:

    a. Grade 1: 3 inches (75 mm) high and 24 inches (600 mm) wide or less.
    b. Grade 1: 3 to 6 inches (75 to 150 mm) high and 24 inches (600 mm) wide or less.
    c. Grade 1: 6 inches (150 mm) or higher, or 24 inches (600 mm) wide or wider.

4. Computer Keyboard Shelves: Grade 1.
5. Trash Bins: Grade 1; 20 inches (500 mm) high and 16 inches (400 mm) wide or less.

**I. Additional requirements (to supersede conflicting requirements)**

**1. Provide manufacturers and BHMA numbers to designate hardware requirements.**

**2. Provide Butt Hinges that are semi-concealed hinges for overlay doors and comply with BHMA A156.9 Grade 1 criteria.**

**3. Catches if required shall be provided as push-in magnetic catches complying with BHMA A156.9 Grade 1 criteria.**

**4. Provide shelf rests that comply with BHMA A156.9 Grade 1 criteria.**

**5. Provide back mounted wire pulls, 5 inches long, 2-1/2 inches deep and 5/16" in diameter.**

**6. Provide shelf rests complying with BHMA A156.9, B04013.**

**7. Provide drawer slides that are side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings that comply with BHMA A156.9, Grade 1 criteria and rated for the following loads:**
**a. Box Drawer Slides: 100 lbf**
**b. File Drawer Slides: 200 lbf**
**c. Keyboard Slide: 100 lbf**

**8. Provide locks as required that comply with ANSI 156.11, grade 1 cycle testing. Confirm if locks need to be keyed alike.**

**9. Provide molded-plastic grommets for cable passage through countertops. Coordinate proper size required for use. Specify number of grommets required with a minimum of one (1) at each workstation.**

**10. Exposed hardware Finish: Specify finish complying with BHMA A156.18 for BHMA finish:**
**a. Satin Stainless Steel: BHMA 630**

2.8 OTHER CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in **Section 087111 "Door Hardware."**

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Accuride International.
b. Blum, Julius & Co., Inc.
c. CompX International, Inc.
d. Hettich America L.P.
e. Knape & Vogt Manufacturing Company.

f. Architect approved prior to Bid.

B. Catches: **Magnetic catches, ANSI/BHMA A156.9, B03141**

C. Shelf Rests: ANSI/BHMA A156.9, B04013; **metal**.

D. Slides for Sliding Glass Doors: ANSI/BHMA A156.9, B07063; **aluminum**.

E. Door Locks: ANSI/BHMA A156.11, E07121.

F. Drawer Locks: ANSI/BHMA A156.11, E07041.

G. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.

H. Grommets for Cable Passage: **2-inch (51-mm)** OD, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Color: **White solid surface: white; dark colored solid surface or wood: black**

I. Exposed Hardware Finishes: **All hardware to be concealed from view.**

J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.9 DRAWER SYSTEMS

A. Drawer Systems: ANSI/BHMA 156.9, Grade 1, full extension, double-walled, side-profile, steel drawer system with a synchronized, full-extension, soft-close drawer slide.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Grass America Inc.; Nova Pro Drawer System or comparable product by one of the following:

a. Accuride International.
b. Blum, Julius & Co., Inc.
c. CompX International, Inc.
d. Hettich America L.P.
e. Knape & Vogt Manufacturing Company.
f. Architect approved prior to Bid.

2. Drawer Side Height: **4.75 inches (122 mm)**.
3. Load Capacity: **84 lb (38 kg)**.
4. Cabinet Member Set, 84 lb (38 kg): [**11 inches (270 mm)**] [**14 inches (350 mm)**] [**16 inches (400 mm)**] [**18 inches (450 mm)**] [**20 inches (500 mm)**] [**22 inches (550 mm)**].
5. Cabinet Member Set, 154 lb (70 kg): [**18 inches (450 mm)**] [**20 inches (500 mm)**] [**22 inches (550 mm)**].
6. Mounting brackets: [**Screw-on**] [**Dowelled**].

2.10 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: **Softwood or hardwood lumber**, **Fire-retardant-treated softwood lumber**, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

**1. Provide Screws to be select material, type, size, and finish required for each use. Comply with ASME B18.6.1 for applicable requirements.**
   **a. For metal framing supports, specify screws as recommended by metal-framing manufacturer.**
**2. Provide Nails to be select material, type, size, and finish required for each use. Comply with FS FF-N-105 for applicable requirements.**
**3. Provide Anchors to be select material, type, size, and finish required for each substrate for secure anchorage. Specify nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Specify toothed steel or lead expansion bolt devices for drilled-in-place anchors.**

C. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Adhesives: Do not use adhesives that contain urea formaldehyde.

E. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.11 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate architectural cabinets to dimensions, profiles, and details indicated. Ease edges and corners to 1/16-inch (1.5-mm) radius unless otherwise indicated.

C. Assemble drawer systems in accordance with manufacturer's written instructions.

D. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as

intended and check measurements of assemblies against field measurements before disassembling for shipment.

E. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

F. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual."

1. For glass in wood frames, secure glass with removable stops.
2. For exposed glass edges, polish and grind smooth.

**G. Additional Requirements**

**1. Specify the following requirements for interior woodwork grade: interior woodwork shall comply with the referenced quality standard and of the following grade:**
   **a. Grade:**
      **i. Premium Grade in public areas, executive offices, and meeting rooms. This grade shall be specified in all areas of high use and other areas requiring premium finish materials and full edge laminations.**
      **ii. Custom Grade in all other areas.**

**2. Specify the following requirements for wood moisture content: comply with requirements of referenced quality standard for wood moisture content in relation to relative humidity conditions existing during time of fabrication and in installation areas.**

**3. All woodwork shall have eased edges to radius indicated for the following:**
   **a. Corners of cabinets and edges of solid-wood (lumber) members 3/4 inch thick or less: 1/16 inch.**
   **b. Edges of rails and similar members more than 3/4 inch thick: 1/8 inch.**

**4. Specify complete fabrication, including assembly, and hardware application, before shipment to Project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.**

**5. Specify shop-cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Specify to locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Require smooth edges of cutouts and, where located in countertops and similar exposures, seal edges with a water-resistant coating.**

2.12 SHOP FINISHING

A. General: Finish architectural cabinets at manufacturer's shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.

B. Transparent Finish:

1. Architectural Woodwork Standards Grade: **Custom**
2. Finish: System - **water-based polycyrlic sealer**.
3. Wash Coat for Closed-Grain Woods: Apply wash-coat sealer to cabinets made from closed-grain wood before staining and finishing.
4. Staining: **None required**.
5. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
6. Sheen: **Satin, 31-45**.

C. Opaque Finish:

1. Architectural Woodwork Standards Grade: **Custom**.
2. Finish: System - **water-based polyurethane.**
3. Color: **Refer to Drawings.**
4. Sheen: **Satin, 31-45**.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

### 3.2 INSTALLATION

A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

1. Install drawer systems in accordance with manufacturer's written instructions.

C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails **or finishing screws** for exposed fastening, countersunk and filled flush with cabinet surface.

1. For shop-finished items, use filler matching finish of items being installed.

D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm) using concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
3. Maintain veneer sequence matching of cabinets with transparent finish.
4. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with **No. 10 wafer-head screws sized for not less than 1-1/2-inch (38-mm) penetration into wood framing, blocking, or hanging strips** or **No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish** or **toggle bolts through metal backing or metal framing behind wall finish**].

E. Shop Finishes: Touch up finishing after installation of architectural cabinets. Fill nail holes with matching filler.

1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

## 3.3 FIELD QUALITY CONTROL

A. Inspections: Provide inspection of installed Work through **AWI's Quality Certification Program** or **WI's Certified Compliance Program**] certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.

1. Inspection entity shall prepare and submit report of inspection.

## 3.4 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces. Touch up finishes to restore damaged or soiled areas.

END OF SECTION 064113

# SECTION 066510 - SOLID SURFACE

## 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 the following horizontal and trim solid surface product types:

**1. Countertops with integral sinks, to be fabricated in one piece.**

B. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for Blocking.
2. Division 9 Section "Wall Cladding."
3. Division 15 Section "Plumbing Fixtures."
4. Division 16 Section "Wiring Devices."

### 1.3 DEFINITION

A. Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

### 1.4 SUBMITTALS

A. Product data:

1. For each type of product indicated.

B. Shop drawings:

1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.

    a. Show full-size details, edge details, thermoforming requirements, attachments, etc.
    b. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
    c. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in solid surface.

C. Samples:

1. For each type of product indicated.

a. Submit minimum 4-inch by 4-inch sample in specified gloss.
b. Cut sample and seam together for representation of inconspicuous seam.
c. Indicate full range of color and pattern variation.

2. Approved samples will be retained as a standard for work.

D. Supplier and Product data:

1. Indicate product description, fabrication information and compliance with specified performance requirements.

E. Product certificates:

1. For each type of product, signed by product manufacturer.

F. Fabricator/installer qualifications:

1. Provide copy of certification number.

G. Maintenance data:

1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions.

a. Maintenance kit for finishes shall be submitted.

2. Include in project closeout documents.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.

B. Fabricator/installer qualifications:

1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.

C. Applicable standards:

1. Standards of the following, as referenced herein:

a. American National Standards Institute (ANSI)
b. American Society for Testing and Materials (ASTM)
c. National Electrical Manufacturers Association (NEMA)

d. NSF International

2. Fire test response characteristics:

a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:

1) Flame Spread Index: 25 or less.
2) Smoke Developed Index: 450 or less.

D. Coordination drawings:

1. Shall be prepared indicating:

a. Plumbing work.
b. Electrical work.
c. Miscellaneous steel for the general work.
d. Indicate location of all walls (rated and non-rated), blocking locations and recessed wall items, etc.

2. Content:

a. Project-specific information, drawn accurately to scale.
b. Do not base coordination drawings on reproductions of the contract documents or standard printed data.
c. Indicate dimensions shown on the contract drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.
d. Provide alternate sketches to designer for resolution of such conflicts.

1) Minor dimension changes and difficult installations will not be considered changes to the contract.

E. Drawings shall:

1. Be produced in 1/2-inch scale for all fabricated items.

F. Drawings must be complete and submitted to the architect within 60 days after award of contract for record only.

1. No review or approval will be forthcoming.

2. Coordination drawings are required for the benefit of contractor's fabricators/installers as an aid to coordination of their work so as to eliminate or reduce conflicts that may arise during the installation of their work.

G. Job mock-up:

1. Prior to fabrication of architectural millwork, erect sample unit to further verify selections made under sample submittals and to demonstrate the quality of materials and execution.

2. Mock-up shall be kitchen countertop and sink.

3. Build the mock-up to comply with the contract documents and install in a location as directed by the architect.

4. Notify the architect two weeks in advance of the date of when the mock-up will be delivered.

5. Should mock-up not be approved, re-fabricate and reinstall until approval is secured.

   a. Remove rejected units from project site.

6. After approval, the mock-up may become a part of the project.

7. This mock-up, once approved, shall serve as a standard for judging quality of all completed units of work.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver no components to project site until areas are ready for installation.

B. Store components indoors prior to installation.

C. Handle materials to prevent damage to finished surfaces.

1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.7 WARRANTY

A. Provide manufacturer's warranty against defects in materials.

1. Warranty shall provide material and labor to repair or replace defective materials.

2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

B. Manufacturer's warranty period:

1. Ten years from date of substantial completion.

1.8 MAINTENANCE

A. Provide maintenance requirements as specified by the manufacturer.

PART 2 — PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:

1. Sheet Material to be Corian® surfaces from the DuPont company

**a. Supplied by C H Briggs – (800) 355-1000**
**Paul Stephens**
**Specification Associate**
**468 Townsend St.**
**Grayson, GA 30017**
**678-662-0919**
**pstevens@chbriggs.com**

2. Approved Equals prior to Bid.

2.2 MATERIALS

A. Solid polymer components

1. Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.

2. Superficial damage to a depth of 0.010 inch (.25 mm) shall be repairable by sanding and/or polishing.

B. Thickness:

1. 1/2 inch

C. Edge treatment:

1. As indicated

D. Integral sink:

1. Model number:

a. Refer to architectural and plumbing drawings

2. Color:

a. Refer to architectural drawings.

3. Mounting:

a. Seamed under mount.

E. Backsplash:

1. Applied.

F. Sidesplash:

1. Applied.

2.3 ACCESSORIES

A. Joint adhesive:

1. Manufacturer's standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.

B. Sealant:

1. Manufacturer's standard mildew-resistant, FDA-compliant, NSF 51-compliant (food zone — any type), UL-listed silicone sealant in colors matching components.

2.4 FACTORY FABRICATION

A. Shop assembly

1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.

2. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.

a. Reinforce with strip of solid polymer material, 2" wide.

3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.

4. Rout and finish component edges with clean, sharp returns.

a. Rout cutouts, radii and contours to template.
b. Smooth edges.
c. Repair or reject defective and inaccurate work.

5. Cut pieces to finished dimensions.
6. Sand edges and remove nicks and scratches.

2.5 FINISHES

A. Select from the manufacturer's standard color chart.

1. Color:

a. Dupont Corian® **Refer to Drawing I110 for color**
b. Approved equal prior to bid.

B. Finish:

1. Provide surfaces with a uniform finish.

a. Matte; gloss range of 5–20.

PART 3 — EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.

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

3.2 INSTALLATION

A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

1. Provide product in the largest pieces available.

2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.

a. Exposed joints/seams shall not be allowed.

3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.

4. Cut and finish component edges with clean, sharp returns.

5. Rout radii and contours to template.

6. Anchor securely to base cabinets or other supports.

7. Align adjacent countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.

8. Carefully dress joints smooth, remove surface scratches and clean entire surface.

9. Install countertops with no more than 1/8-inch (3 mm) sag, bow or other variation from a straight line.

B. Coved backsplashes and applied sidesplashes:

1. Install applied sidesplashes using manufacturer's standard color-matched silicone sealant.

2. Adhere applied sidesplashes to countertops using manufacturer's standard color-matched silicone sealant.

3. Adhere to countertops using manufacturer's standard color-matched Joint Adhesive.

3.3 REPAIR

A. Repair or replace damaged work that cannot be repaired to architect's satisfaction.

3.4 CLEANING AND PROTECTION

A. Keep components clean during installation.

B. Remove adhesives, sealants and other stains

END OF SECTION 066510

# SECTION 071900 - UNDER-SLAB VAPOR BARRIER/RETARDER

## PART 1 – GENERAL

1. SUMMARY

   A. Products Supplied Under This Section

      1. Vapor Barrier, seam tape, mastic, pipe boots for installation under concrete slabs.

   B. Related Sections

      1. Section 03300 Cast-in-place Structural Concrete
      2. Section 07260 Under-Slab Vapor Retarder

2. REFERENCES

   A. American Society for Testing and Materials (ASTM)

      1. ASTM E 1745-97 (2004) Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
      2. ASTM E 154-88 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
      3. ASTM E 96-95 Standard Test Methods for Water Vapor Transmission of Materials.
      4. ASTM E 1643-98 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

   B. American Concrete Institute (ACI)

      1. ACI 302.1R-04 Vapor Barrier Component (plastic membrane) is not less than 10 mils thick.

3. SUBMITTALS

   A. Quality Control / Assurance

      1. Independent laboratory test results showing compliance with ASTM & ACI Standards.
      2. Manufacturer's samples, literature.
      3. Manufacturer's installation instructions for placement, seaming and pipe boot installation.

## PART 2 – PRODUCTS

1. MATERIALS

   A. Vapor Barrier

      1. Vapor Barrier must have the following qualities:

a. Water Vapor Transmission Rate ASTM E 96 0.006 WVTR or lower
b. Water Vapor Barrier (Plastics) ASTM E 1745 Meets Class A

2. Vapor Barrier Products:
   a. **Stego Wrap 15-mil Vapor Barrier by Stego Industries LLC. (Basis of Design)**
   b. Premoulded Membrane with Plasmatic Core by W.R. Meadows.
   c. Architect approved equal prior to Bid.

2. ACCESSORIES

A. Seam Tape:

1. Tape must have the following qualities:
   a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower

2. Seam Tape:
   a. Stego Tape by STEGO INDUSTRIES LLC, San Juan Capistrano, CA (877) 464-7834 www.stegoindustries.com

B. Vapor Proofing Mastic:

1. Mastic must have the following qualities:
   a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower

2. Mastic:
   a. Stego Mastic by STEGO INDUSTRIES LLC, San Juan Capistrano, CA (877) 464-7834 www.stegoindustries.com

C. Pipe Boots:

1. Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.

PART 3 – EXECUTION

1. PREPARATION

A. Ensure that subsoil is approved by architect or geotechnical firm:

1. Level and tamp or roll aggregate, sand or tamped earth base.

2. INSTALLATION

A. Install Vapor Barrier/Retarder:

1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643-98.
   a. Unroll Vapor Barrier/Retarder with the longest dimension parallel with the direction of the pour.

b. Lap Vapor Barrier/Retarder over footings and seal to foundation walls.
c. Overlap joints 6 inches and seal with manufacturer's tape.
d. Seal all penetrations (including pipes) per manufacturer's instructions.
c. No penetration of the Vapor Barrier/Retarder is allowed except for reinforcing steel and permanent utilities.
d. Repair damaged areas by cutting patches of Vapor Barrier/Retarder, overlapping damaged area 6 inches and taping all four sides with tape.

END OF SECTION 071900

SECTION 072100 – THERMAL INSULATION

PART 1 – GENERAL

1. SUMMARY

    A. Section Includes:

        1. Extruded polystyrene foam-plastic board.

        2. Glass-fiber blanket.

        3. Spray Foam

        4. Acoustic Batts

2. ACTION SUBMITTALS

    A. Product Data: For each type of product.

3. INFORMATIONAL SUBMITTALS

    A. Product test reports.

    B. Research reports.

**4. CRITERIA**

**A. Single-Source Responsibility for Insulation Products: Require each type of building insulation be obtained from a single source with resources to provide products complying with requirements indicated without delaying the Work.**

**B. Fire-Test-Response Characteristics: Insulation and related materials shall be specified with the fire-test-response characteristics, as determined by testing, identical products per test method indicated below. Identify materials with appropriate markings of applicable testing and inspecting agency.**
   **1. Surface-Burning Characteristics: ASTM E 84.**
   **2. Fire-Resistance Ratings: ASTM E 119.**
   **3. Combustion Characteristics: ASTM E 136.**

**C. Provide a 15-year written warranty be provided stating that the actual thermal resistance of the extruded polystyrene insulation will not vary by more than 10% from its published thermal resistance.**

**D. All perimeter walls shall be insulated full height and sealed tight against air infiltration at the deck using spray foam insulation.**

**E. No exposed insulation is permitted within a plenum air space.**

PART 2 – PRODUCTS

**1. INSULATION APPROVED MANUFACTURERS:**

**1. Formaldehyde-Free Building Insulation:**
**a. Johns-Manville (Basis of design).**
**2. Extruded-Polystyrene Board Insulation:**
**a. Dow Chemical Co. (Basis of design).**
**3. Formaldehyde-free concealed sound control batts:**
**a. Johns-Manville (Basis of design).**
**4. Closed-cell Spray Polyurethane Foam Insulation with separate Ignition Barrier Coating:**
**a. Johns-Manville (Basis of design).**

**2. FACED BATTS (IN WALL CAVITY INSULATION)**

**B. Formaldehyde-free™ FSK-25 Faced Batts:**
**1. Thermal Resistance (R-Value) (ASTM C518): R-13 MINIMUM**
**2. Combustion Characteristics (ASTM E136): Pass.**
**3. Critical Radiant Flux (ASTM E970): Greater than 0.11 Btu/ft2 × s (0.12 W/cm2).**
**4. Water Vapor Permeance (ASTM E96): 0.05 perm (3 ng/Pa × s × m2).**
**5. Water Vapor Sorption (ASTM C1104): 5% or less.**
**6. Odor Emission (ASTM C1304): Pass.**
**7. Corrosiveness (ASTM C665, 13.8): Pass.**
**8. Fungi Resistance (ASTM C1338): Pass.**
**Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.**
**9. Recycled Content: Certified by Scientific Certification Systems to contain minimum of 20% post-consumer and 5% pre-consumer recycled glass product, on average of manufacturer's products.**
**10. Prove through documentation that product passes CIWMB Section 01350 for indoor air quality.**
**11. Flamespread (ASTM E84): 25, maximum.**
**12. Smoke Developed (ASTM E84): 50, maximum.**
**13. Material Standard: ASTM C665, Type III, Class A, Category 1.**

**3. CONTINUOUS (EXTERIOR WALL INSULATION)**

A. Rigid wall insulation shall be Expanded Extruded Polystyrene board, nominally **48" x 96" x 1 ½ inches**, unless otherwise indicated.

B. Insulation shall meet or exceed the following test requirements and results: EPS shall comply with ASTM C578, Type IV, Federal Specifications HH I 524C Type (I or II) and tested in accordance with ASTM C578 or UL723, with a flame spread of less

than 25 and smoke development of less than 450 as required by the applicable building codes.

C. Minimum allowable density shall be 1.0 PCF in accordance with ASTM C177, thermal conductivity shall provide a K factor of .24 at 40 degrees Fahrenheit and .26 at 75 degrees Fahrenheit.

D. Insulation board shall be aged. If air dried, insulation board shall be aged for not less than six weeks in block form prior to cutting and shipping. Other methods of aging shall be equivalent to six weeks aged (air dried) insulation board and certified as equivalent by insulation board manufacturer.

E. Variations in tolerances in dimensions of insulation board shall be minimized.

F. All insulation board shall be labeled on each package to provide information required by Applicable Codes.

**G. Extruded-Polystyrene Board Insulation: Rigid closed cell extruded polystyrene thermal board insulation. Comply with ASTM C 578-95 and with other requirements indicated below:**

**1. Type IV, density 1.6 lb/cu. ft. min., compressive strength 25 psi (ASTM D 1621-94).**
**2. Thermal resistance: 5-year aged R-values of 5.4 and 5.0 min. deg F-ft2-h/Btu2/inch at 40deg F and 75deg F respectively (ASTM C 518-91).**
**3. Water absorption: Max 0.1% by volume (ASTM C 272-91(96)).**
**4. Surface-Burning Characteristics:**
**a. Flame-spread: 5.**
**b. Smoke Developed: 165.**
**5. Thickness: 1-1/2" (R-7.5)**
**6. Acceptable manufacturer's product: The Dow Chemical Company "STYROFOAM CAVITYMATE Plus" material.**

**5. SOUND CONTROL BATTS**

**B. Formaldehyde-Free Sound Control Batts: comply with requirements indicated below:**

**1. Thickness: 3-5/8" in partitions and 6-1/2" over ceilings. Refer to Gypsum Board assemblies for additional requirements.**
**2. Noncombustible per ASTM E136.**
**3. Recycled Content: Certified by Scientific Certification Systems to contain minimum of 20% post-consumer and 5% pre-consumer recycled glass product, on average of manufacturer's products.**
**4. Prove through documentation that product complies with CIWMB Section 01350 for indoor air quality.**
**5. Flamespread (ASTM E84): 25 or less.**
**6. Smoke Developed (ASTM E84): 50 or less.**

**6. SPRAY FOAM INSULATION**

**B. JM Corbond III Closed-cell Spray Polyurethane Foam with separate Ignition Barrier Coating:**

**1. Nominal Density (ASTM D1622): 2.0 lb/cu ft.**
**2. Compressive Strength (ASTM D1621): 25 psi.**
**3. Closed-cell Content (ASTM D1940): >90%.**
**4. R-value (ASTM C518-initially): 6.6**
**5. R-value (ASTM C1029-07-180 day aged): 6.4**
**6. Water Absorption (ASTM D2842): 0.020 gm/cc**
**7. Water Vapor Transmission (ASTM E96): 0.61 perms @ 1.5"**

7. ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.

2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.

C. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

D. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

8. OTHER PRODUCTS

A. Sill sealer shall be fiberglass sill sealer.

B. Fastening devices and/or adhesives shall be as standard with or as recommended by the manufacturer.

C. Mastic sealer shall be a type recommended by insulation manufacturer for bonding edge joints between units and filling voids in the Work.

D. Safing insulation shall be a mineral fiber product conforming to ASTM C665 or a ceramic fiber conforming to ASTM C892 of thickness tested for application as shown on the drawings.

1. Insulation shall be one of the following:

    a. USG Thermafiber Safing insulation.
    b. Manville Pyro-Fiber Safing insulation.
    c. Sohio Carborundum Durablanket FP insulation.

E. Acoustical Ceiling Batts: Provide 24 x 48 paperless R11, 3½" , semi-rigid spun mineral fiber R-11, sizes as required in accordance with ASTM C 665, ASTM C653 and ASTM C518.

    1. Acceptable Manufacturers:

        a. Johns Manville
        b. Owens-Corning Fiberglass Corp.
        c. U.S. Gypsum

PART 3 – EXECUTION

1. INSTALLATION, GENERAL

    A. Comply with insulation manufacturer's written instructions applicable to products and applications.

    B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
    C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

    D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

2. INSTALLATION OF CAVITY-WALL INSULATION

    A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches (610 mm) o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.

        1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 04 2613 "Masonry Veneer."

3. ABOVE CONCRETE SLAB UNDER RAISED FLOOR INSULATION

    A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches (610 mm) o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation between raised floor posts and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.

4. INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

    A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

        1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
        2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
        3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
        4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
        5. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
        6. For wood-framed construction, install blankets according to ASTM C 1320.

    B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

        1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
        2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

5. Rigid Insulation:

    A. Install insulation only when construction has advanced to the point that remaining construction operations will not damage the insulation. Remove and replace damaged insulation.

        1. Seal all joints between closed-cell (non-breathing) rigid insulation units by applying mastic sealer to the edges of each unit to form a tight seal as units are installed. Fill voids in completed installation with mastic or sealant.

    B. Where electric outlets, ducts, pipes, vents, or other utility items occur, place insulation on the cold or weather side of the obstruction.

1. Install rigid insulation without gaps over entire surface to be insulated.
2. Secure rigid wall insulation with adhesives or mechanical fasteners as required by manufacturer's recommendations. Cut to lines as required for flashing installation. Fit insulation tightly around penetrations and pack remaining voids with batt insulation.
3. Stagger insulation joints.
4. Edges of roof insulation shall be supported by the top flat surface of the metal deck.
5. Fasteners used to secure the roof insulation shall penetrate the top flat surface of the metal deck.
6. The roofing contractor shall provide the manufacturer's recommended fastening pattern for securing the roof insulation to the metal deck.

6. PROTECTION OF MATERIAL FROM DAMPNESS

A. At the time construction materials are received on site, they shall be inspected for dryness, and any material not completely free of dampness shall be rejected and replaced prior to being set into the building areas. If materials are to be stored on site prior to use in construction, they shall be stored on pallets, clearly and visibly off the ground and away from any ponding or puddling of ground water. The stored material shall further be completely protected from rain and other moist weather with plastic sheeting or tarps, which shall be adequately vented to avoid condensation build-up. The use of manufacturer's plastic wraps as the sole means of protection is not acceptable. Once built into the construction, even though the building may not be dried-in, the materials shall be protected from becoming wet by rain or other moist weather with plastic sheeting.

END OF SECTION 072100

# SECTION 072726 – FLUID APPLIED MEMBRANE AIR BARRIER, VAPOR PERMEABLE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes fluid-applied, vapor-permeable membrane air barriers.

### 1.2 RELATED REQUIREMENTS

A. Division 01 Section "Sustainable Design Requirements" for additional requirements, including [LEED] documentation requirements.

B. Section 04 20 00 "Unit Masonry" for [air barrier substrates and] compatibility with flashing components.

C. Section 04 21 13 “Brick Masonry” for compatibility with flashing components.

D. Section 06 16 00 “Sheathing” for air barrier substrates and joint treatments.

E. Division 07 roofing sections for roof assembly air barriers and interface coordination.

F. Division 08 exterior openings sections for framing for aluminum-framed entrances and storefronts, aluminum windows and louvers and vents receiving air barrier transition assembly specified in this section.

### 1.3 REFERENCES

A. References, General: Versions of the following standards current as of the date of issue of the project apply to the Work of this Section.

B. Air Barrier Association of America (ABAA): www.airbarrier.org:

1. ABAA Quality Assurance Program

C. ASTM International (ASTM): www.astm.org:

1. ASTM A 240/A 240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
2. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants
3. ASTM C 1193 - Guide for Use of Joint Sealants
4. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
5. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials

6. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials
7. ASTM E 162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source
8. ASTM E 783 - Standard Test Method for Field Measurement of Air Leakage through Installed Exterior Windows and Doors
9. ASTM E 1186 - Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
10. ASTM E 2178 - Standard Test Method for Air Permeance of Building Materials
11. ASTM E 2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

D. National Fire Protection Association (NFPA): www.nfpa.org:

1. NFPA 285 - Standard Fire Test Method For Evaluation Of Fire Propagation Characteristics Of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

E. US Green Building Council (USGBC): www.usgbc.org:

1. Leadership in Energy and Environmental Design (LEED) Green Building Rating System

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate installation of joint sealants with cleaning of joint sealant substrates and other operations that may impact installation or finished joint sealant work.

B. Preinstallation Conference: Conduct conference at Project Site.

1. Review requirements for air barrier products and installation, project and manufacturer's details, mockups, testing and inspection requirements, and coordination and sequencing of air barrier work with work of other Sections.
2. Review manufacturer's instructions for air barrier application meeting Project requirements for substrates specified, including three-dimensional video model demonstrating proper application of components at wall openings.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of air barrier product specified, including:

1. Technical data indicating compliance with requirements.
2. Substrate preparation instructions and recommendations.

C. Shop Drawings: Show locations for air barrier. Show details for each type of substrate, joints, and edge conditions, including flashings, counter flashings, penetrations, transitions, and terminations.

1. Show location of transition and accessory materials providing connectivity throughout the assemblies.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturer, and Air Barrier Inspector.

1. Certification of manufacturer's approval of Installer.
2. Certification of ABAA accreditation of Installer firm and list of Installer's ABAA-certified installers and supervisors on Project.

B. Manufacturer's Product Compatibility Certificate: Certify compatibility of air barrier products with adjacent materials.

C. Low-Emitting Product Certificate: For air barrier products specified to meet volatile organic emissions standards, submit Greenguard Children and Schools Certification or comparable certification acceptable to Architect.

D. Fire Propagation Characteristics Certificate: From a qualified testing agency, documentation that air barrier system as a component of a wall assembly has been tested and passed NFPA 285. Include system classification number of testing agency on shop drawings.

E. Product Test Reports: Test data for air barrier products and air barrier assembly, by qualified testing agency, indicating proposed membrane air barrier meets performance requirements, when requested by Architect.

F. Warranty: Sample of unexecuted manufacturer and installer special warranties.

G. Field quality control reports.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A firm with minimum [three] years' experience in installation of specified products in successful use on similar projects, employing workers trained by manufacturer, including a full-time on-site supervisor with a minimum of [three] years' experience installing similar work, able to communicate verbally with Contractor and employees.

1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

B. Manufacturer Qualifications: A qualified manufacturer with minimum five years' experience in manufacture of air barrier membrane as one of its principal products.

1. Manufacturer's product submitted has been in satisfactory operation on five similar installations for at least five years.
2. Manufacturer is accredited by the Air Barrier Association of America.

3. Approval of Manufacturers and Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:

    a. Completed and signed Substitution Request form.
    b. Product data, including certified independent test data indicating compliance with requirements.
    c. Sample shop drawings from similar project.
    d. Project references: Minimum of five installations of similar system not less than five years old, with Owner and Architect contact information.
    e. Certificate of ABAA accreditation if required for Project.
    f. Sample warranty.

4. **Demonstrate a minimum of 20 years in the production and sales of waterproofing products. Installer of air barrier materials shall demonstrate qualifications to perform the work by submitting the following: Written confirmation or certification from the air barrier manufacturer that the installer has been trained and is recognized by the manufacturer as suitable for the execution of the work.**

C. Air Barrier Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified air barrier system, qualified to perform observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.
2. A independent party certified as an air barrier inspector by the ABAA or other certifying organization acceptable to Architect, retained by the Contractor.

D. Mockups: Provide air barrier mockup application within mockups required in other sections, or if not specified, in an area of not less than 150 sq. ft. of wall surface as directed by Architect for each type of backup wall construction. Include examples of surface preparation, crack and joint treatment, air barrier application, and flashing, transition, and termination conditions, to set quality standards for execution.

1. Include intersection of wall air barrier with roof air barrier and with foundation wall intersection.

## 1.8 DELIVERY, STORAGE AND HANDLING

A. Accept materials on site in manufacturer's unopened original packaging.

B. Store products in weather protected environment, clear of ground and moisture, within temperature ranges recommended by air barrier manufacturer.

C. Construction Waste: Store and dispose of packaging materials and construction waste in accordance with requirements of Division 01 Section "Construction Waste Management" and "Temporary Facilities and Controls."

1.9 ENVIRONMENTAL REQUIREMNTS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1.10 SCHEDULING

A. Coordinate installation of membrane air barrier with completion of roofing and other work requiring interface with air barrier.

B. Schedule work so air barrier applications may be inspected prior to concealment.

C. Ensure air barrier materials are cured before covering with other materials.

1.11 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer's standard form in which air barrier manufacturer agrees to furnish and install air barrier material to repair or replace those materials installed according to manufacturer's written instructions that exhibit material defects or otherwise fail to perform as specified under normal use within warranty period specified.

1. Access for Repair: Owner shall provide unimpeded access to the Project and the air barrier system for purposes of testing, leak investigation, and repair, and shall reinstall removed cladding materials upon completion of repair.
2. Cost Limitation: Manufacturer's obligation for repair or replacement shall be limited to the original installed cost of the work.
3. Warranty Period: 1 year from date of Substantial Completion.

B. Special warranties specified in this article exclude deterioration or failure of air barrier materials from the following:

1. Movement of the structure caused by structural settlement or stresses on the air barrier exceeding manufacturer's written specifications for elongation.
2. Mechanical damage caused by outside agents.

**1.12 PERFORMANCE**

**A. The building envelope shall be constructed with a continuous air barrier to control air leakage into, or out of the conditioned space. An air barrier shall also be provided for interior partitions between conditioned space and space designed to maintain temperature or humidity levels which differ from those in the conditioned space by more than 50% of the difference between the conditioned space and design ambient conditions. The air barrier shall have the following characteristics:**

1. **It must be continuous, with all joints made airtight.**
2. **It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.**
3. **It shall be durable or maintainable. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:**

    i. **Foundation and walls.**
    ii. **Walls and windows or doors.**
    iii. **Different wall systems.**
    iv. **Wall and roof.**
    v. **Wall and roof over unconditioned space.**
    vi. **Walls, floor and roof across construction, control and expansion joints.**
    vii. **Walls, floors and roof to utility, pipe and duct penetrations.**

**B. Air barrier penetrations:**

1. **All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.**

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: Provide air barrier products manufactured by Tremco, Inc., Commercial Sealants and Waterproofing Division, An RPM Company, Beachwood OH; (866) 321-6357; email: techresources@tremcoinc.com; www.tremcosealants.com, or comparable products of other manufacturer approved by Architect in accordance with Instructions to Bidders and Division 01 General Requirements.

2.2 MATERIALS, GENERAL

A. Source Limitations: Obtain air-barrier materials from single source from single manufacturer.

B. VOC Content: 250 g/L maximum per 40 CFR 59, Subpart D (EPA Method 24) and complying with requirements of authorities having jurisdiction.

C. Compatibility: Provide membrane air barrier materials that are compatible with one another and with adjacent materials under conditions of service and application required, as demonstrated by membrane air barrier manufacturer based on testing and field experience.

2.3 PERFORMANCE REQUIREMENTS

A. General: Membrane air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a moisture drainage plane transitioned to adjacent flashings and discharging water to the building exterior. Membrane air barriers shall accommodate substrate movement and seal expansion and control joints, construction material transitions, opening transitions, penetrations, and perimeter conditions without moisture deterioration and air leakage exceeding performance requirements.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 2357.

C. Fire Propagation Characteristics: Provide air barrier system qualified as a component of a comparable wall assembly that has been tested and passed NFPA 285.

2.4 MEMBRANE AIR BARRIER

A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: Elastomeric, polymer-modified bituminous membrane, formulated for application no less than 40 mils (dry).

1. Basis of Design Product: Tremco, Inc., ExoAir 220.
2. Air Permeance, ASTM E 2178: 0.004 cfm/sq. ft of surface area at 1.57-lbf/sq. ft. pressure difference.
3. Vapor Permeance, ASTM E 96/E96M: Minimum 12 perms.
4. Elongation, Ultimate, ASTM D 412, Die C: 800 percent, minimum.
5. VOC Content: Less than XX

2.5 ACCESSORY MATERIALS

A. General: Accessory materials as described in manufacturer's written installation instructions, recommended to produce complete air barrier assembly meeting performance requirements, and compatible with air barrier membrane material and adjacent materials.

B. Primer: Liquid primer meeting VOC limitations, recommended for substrate by membrane air barrier manufacturer, when installing modified bituminous self-adhered membranes
1. Basis of Design Product: Tremco, Inc., ExoAir Primer

C. Transitions:
1. Counterflashing Strip: Modified bituminous, 40 mils thick self-adhering composite sheet consisting of 32 mils of SBS rubberized asphalt laminated to an 8 mils high-density, cross-laminated polyethylene film, for counterflashing of metal flashings and for substrate transitions and for termination of air barrier to bituminous roof membranes and to air barrier terminations at openings.
a. Basis of Design Product: Tremco, Inc., ExoAir TWF Thru-Wall Flashing.

2. High Temperature Flashing Strip and Underlayment: Butyl, 24 mil thick self-adhering composite sheet consisting of 20 mils of butyl laminated to 4 mil

polyethylene film; thermally stable under intermittent, non-continuous exposure up to 240 deg F.
a. Basis of Design Product: Tremco, Inc., ExoAir 111.

3. Foil Flashing Strip: Butyl, 24 mil thick self-adhering composite sheet consisting of 20 mils of butyl laminated to 4 mil polyethylene film; thermally stable under intermittent, non-continuous exposure up to 240 deg F
a. Basis of Design Product: Tremco, Inc., ExoAir 111.

4. Butyl Strip: Butyl, 24 mil thick self-adhering composite sheet consisting of 20 mils of butyl laminated to 4 mil polyethylene film; thermally stable under intermittent, non-continuous exposure up to 240 deg F, for termination of air barrier to EPDM or TPO roof membranes.
a. Basis of Design Product: Tremco, Inc., ExoAir 111

5. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.

6. Opening Transition Assembly: Cured low-modulus silicone extrusion, with reinforcing ribs, sized to fit opening widths, [with aluminum race for insertion into aluminum framing extrusions,] with the following characteristics:
a. Basis of Design Product: Tremco, Inc., Proglaze ETA Engineered Transition Assembly. Tear Strength: 110 lb/in (19.3 kN/m)

7. Preformed Silicone-Sealant Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with manufacturer's recommended silicone sealant for bonding extrusions to substrates.
a. Basis of Design Product: Tremco, Inc.; Spectrem SimpleSeal.

D. Liquid Joint Sealants:

1. ASTM C 920, single-component polyurethane, approved by air barrier manufacturer for adhesion and chemical compatibility with membrane air barrier and accessories.
a. Basis of Design Product: Tremco, Inc., Dymonic 100.

2. ASTM C 920, single-component, neutral-curing silicone, approved by air barrier manufacturer for adhesion and compatibility with membrane air barrier and accessories post installation of the membrane. Basis of Design Product: Tremco, Inc., Spectrem 1.

E. Sprayed Polyurethane Foam Sealant: Sprayed Polyurethane Foam Sealant: Foamed-in-place, 1.5- to 2.0-lb/cu. ft. density, with flame-spread index of 25 or less per ASTM E 162, for filling of gaps at openings and penetrations.

1. Basis of Design; Tremco Inc., Flexible Low Expanding Foam (LEF).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Surface Condition: Before applying air barrier materials, examine substrate and conditions to ensure substrates are fully cured, smooth, clean, dry, and free from high spots, depressions, loose and foreign particles and other deterrents to adhesion, and conditions comply with manufacturer's written recommendations.

1. Verify concrete and masonry surfaces are visibly dry, have cured for time period recommended by membrane air barrier manufacturer, and are free from release agents, curing agents, and other contaminates.

2. Test for capillary moisture by method recommended in writing by air barrier manufacturer.
3. Verify masonry joints are filled with mortar and struck flush.

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

3.2 INTERFACE WITH OTHER WORK

A. Commencement of Work: Commence work once air barrier substrates are adequately protected from weather and will remain protected during remainder of construction.

B. Sequencing of Work: Coordinate sequencing of air barrier work with work of other sections that form portions of building envelope air barrier to ensure that flashings and transition materials can be properly installed and inspected. Roofing systems shall be capped and sealed, or top of walls protected, in such a way as to eliminate the ability of water to saturate the wall or interior space, both before and after, air barrier system installation. Coordinate installation of EXOAIR® 220 with the roofing trade to ensure compatibility and continuity with the roofing system.

C. Subsequent Work: Coordinate air barrier work with work of other sections installed subsequent to air barrier to ensure complete inspection of installed air barrier and sealing of air barrier penetrations necessitated by subsequent work.

3.3 PREPARATION

A. Clean, prepare, and treat substrate in accordance with air barrier manufacturer's written instructions.

1. Mask adjacent finished surfaces.
2. Remove contaminants and film-forming coatings from substrates.
3. Remove projections and excess materials and fill voids with substrate patching material.
4. Prepare and treat joints and cracks in substrate per ASTM C 1193 and membrane air barrier manufacturer's written instructions.

3.4 APPLICATION OF ACCESSORY MATERIALS

A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions. Install transition material and other accessories to form connect and seal membrane air barrier material to adjacent components of building air barrier system, including, but not limited to, roofing system air barrier, exterior fenestration systems, door framing, and other openings.

B. Primer: Apply primer to substrates when recommended by air barrier manufacturer at required rate for those substrates that will be receiving a modified bituminous self-adhered membrane. Reprime areas not covered within 24 hours.

C. Assembly Transitions: Connect and seal exterior wall air barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
   1. Opening Transitions: Fill gaps at perimeter of openings with foam sealant and apply approved transition or accessory material.
   2. Penetrations: Fill gaps at perimeter of penetrations with foam sealant and level with approved sealant or seal transition strips around penetrating objects and terminate with approved sealant.
   3. Joints: Bridge and cover isolation joints, expansion joints, and discontinuous joints between separate assemblies utilizing approved transition or accessory materials.
   4. Changes in Plane: Apply approved sealant beads at corners and edges to form smooth transition.
   5. Substrate Gaps: Cover gaps with stainless steel sheet mechanically attached to substrate and providing continuous support for air barrier.

D. Flashings: Seal top of through-wall flashings to membrane air barrier with a continuous bead of approved sealant recommended by air barrier manufacturer.

E. Seal punctures, voids, and seams. Patch with approved transition and accessory materials following air barrier manufacturer's recommendations and extend repair beyond repaired areas to maintain continuity.

3.5 FLUID AIR-BARRIER MEMBRANE INSTALLATION

A. General: Apply fluid air-barrier material to form a seal with transition materials and accessories to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.

B. Membrane Air Barrier: Apply fluid air barrier material in full contact with substrate to produce a continuous seal with transition strips according to membrane air barrier manufacturers written instructions.

   1. Vapor-Permeable Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, but not less than 40-mil dry film thickness, applied in one or more equal coats, roller-or spray-applied.

C. Connect and seal exterior wall air-barrier membrane continuously to subsequently-installed roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, wall openings, and other construction used in exterior wall openings, using approved transitions and accessory materials.

D. Wall Openings: Apply approved sealant to adhere silicone extrusion to perimeter of windows, curtain walls, storefronts, doors, and louvers. Apply [opening transition assembly] [preformed silicone sealant extrusion] according to air barrier transition manufacturer's written instructions.

E. Seal punctures, voids, and seams. Patch with approved transition and accessory materials following air barrier manufacturer's recommendations and extend repair beyond repaired areas to maintain continuity.

F. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections.

B. Testing Agency: Contractor shall engage a qualified Inspector to perform tests and inspections, including documenting of membrane air barrier prior to concealment.

1. Inspections and testing shall be carried out at the following rate:

a. Up to 10,000 sq. ft. (930 sq. m): One inspection.
b. 10,001 to 35,000 sq. ft. (931 to 3,250 sq. m): Two inspections.
c. 35,001 to 75,000 sq. ft. (3,251 to 6,970 sq. m): Three inspections.
d. 75,001 to 125,000 sq. ft.: Four inspections.
e. 125,001 to 200,000 sq. ft.: Five inspections.
f. Over 200,000 sq. ft.: Six inspections.

2. Scope of Testing: Testing shall include the following:

a. Qualitative air-leakage testing per ASTM E 1186.
b. Quantitative air-leakage testing per ASTM E 783.
c. Photo documentation of work to be subsequently concealed.

C. ABAA Audit: Provide Installer audit by ABAA. Coordinate scheduling of work and associated audit inspections. Arrange and pay for site inspections by ABAA to verify conformance with the manufacturer's instructions, ABAA QAP, and requirements of this Section.

D. Coordination of Testing: Cooperate with testing agency. Allow access to work areas and staging. Notify testing agency in writing of schedule for Work of this Section to allow sufficient time for testing and inspection.

1. Do not cover Work until testing and inspection is completed and accepted.

E. Reporting: Forward written inspection reports to the Architect within 10 working days of the inspection and test being performed.

F. Correction: Correct deficient applications not passing tests and inspections, make necessary repairs, and retest as required to demonstrate compliance with requirements.

3.7 CLEANING AND PROTECTING

A. Clean spills, stains, and overspray resulting application utilizing cleaning agents recommended by manufacturers of affected construction. Remove masking materials.

B. Protect membrane air barrier from damage from subsequent work. Protect membrane materials from exposure to UV light for period in excess of that acceptable to membrane air barrier manufacturer; replace overexposed materials and retest.

END OF SECTION 072726

# SECTION 074646 – FIBER CEMENT RAINSCREEN

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES:

A. Exterior, panelized fiber cement cladding system and accessories to complete a drained and back-ventilated rainscreen.

### 1.2 RELATED SECTIONS

A. Section 05 4000 – Cold-Formed Metal Framing

B. Section 06 1053 – Miscellaneous Rough Carpentry

C. Section 06 1600 - Sheathing

D. Section 07 2100 - Thermal Insulation

E. Section 07 2726 – Fluid Applied Membrane Air Barrier, Vapor Permeable

F. Section 07 6200 - Sheet Metal Flashing and Trim

G. Section 07 9200 - Joint Sealants

### 1.3 REFERENCES

A. American Architectural Manufacturers Association (AAMA):

1. AAMA 509-14 – Voluntary Test and Classification Method of Drained and Back Ventilated Rain Screen Wall Cladding Systems

B. ASTM International (ASTM):

1. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

2. ASTM C 1185 - Standard Test Methods for Sampling and Testing Non-Asbestos Fiber Cement.

a. ASTM C 1186 – Standard Specification for Flat Fiber-Cement Sheets.

3. ASTM E-84 - Standard Test for Surface Burning Characteristics of Building Materials.

4. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

5. ASTM E 228 - Standard Test Method for Linear Thermal Expansion of Solid Materials with a Vitreous Silica Dilatometer.

6. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

7. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

C. Florida Building Code - Test Protocol HVHZ

1. Testing Application Standard (TAS) 202, 203 – HVHZ Test Procedures

D. National Fire Protection Association (NFPA):

1. NFPA 285 - Fire Test Method for Exterior Wall Assemblies Containing Combustible Material.

2. NFPA 268 – Ignition Resistance of Exterior Wall Assemblies.

E. Standards Council of Canada & Underwriters Laboratories Canada (ULC):

1. CAN/ULC S-102 – Standard Method of Test for Surface Burning Characteristics.

2. CAN/ULC S-134 – Standard Method of Fire Test of Exterior Wall Assembly.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 3300.

B. Product Data: Submit manufacturer's product description, storage and handling requirements, and installation instructions.

C. Product Test Reports and Code Compliance: Documents demonstrating product compliance with local building code, such as test reports or Evaluation Reports from qualified, independent testing agencies.

E. Manufacturer's Details: Submit drawings (.dwg, .rvt, and/or .pdf formats), including plans, sections, showing installation details that demonstrate product dimensions, edge/termination conditions/treatments, compression and control joints, corners, openings, and penetrations.

F. Samples: Submit samples of each product type proposed for use.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. All fiber cement panels specified in this section must be supplied by a manufacturer with a minimum of 10 years of experience in fabricating and supplying fiber cement cladding systems.

a. Products covered under this section are to be manufactured in an ISO 9001 certified facility.

2. Provide technical and design support as needed regarding installation requirements and warranty compliance provisions.

B. Installer Qualifications: All products listed in this section are to be installed by a single installer trained by manufacturer or representative.

C. Mock-Up Wall: Provide a mock-up wall as evaluation tool for product and installation workmanship.

D. Pre-Installation Meetings: Prior to beginning installation, conduct conference to verify and discuss substrate conditions, manufacturer's installation instructions and warranty requirements, and project requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Panels must be stored flat and kept dry before installation. A waterproof cover over panels and accessories should be used at all times prior to installation. Do not stack pallets more than two high. Refer to the information included on each pallet.

B. If panels are exposed to water or water vapor prior to installation, allow to completely dry before installing. Failure to do so may result in panel shrinkage at ship lap joints, and such action may void warranty.

C. Panels MUST be carried on edge. Do not carry or lift panels flat. Improper handling may cause cracking or panel damage.

D. Direct contact between the panels and the ground should be avoided at all times. It is necessary to keep panels clean during installation process.

1.7 WARRANTY

A. Provide manufacturer's 15-year warranty against manufactured defects in fiber cement panels. Additional 5-year extension available when refinished in year 14-15.

B. Provide manufacturer's 15-year warranty against manufactured defects in panel finish.

C. Warranty provides for the original purchaser. See warranty for detailed information on terms, conditions and limitations.

PART II: PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Nichiha Corporation, 18-19 Nishiki 2-chome Naka-ku, Nagoya, Aichi 460-8610, Japan.

B. Acceptable Manufacturer's Representative: Nichiha USA, Inc., 6465 E. Johns Crossing, Suite 250, Johns Creek, GA 30097. Toll free: 1.866.424.4421, Office: 770.805.9466, Fax: 770.805.9467, www.nichiha.com.

1. Basis of Design Product: Nichiha Roughsawn
    a. Profile colors: **Refer to Drawing A520 for color**.
        b. Profiles: Wood plank texture with three, 3/8" grooves running lengthwise, spaced 5-5/8" apart.
        c. Accessory/Component Options:
            i. Manufactured Corners with 3-1/2" returns for each profile color.
            ii. Aluminum trim options: Corner Key, Open Outside Corner, H-Mold, J-Mold, Compression Joint, Inside Corner
                1. Finish: Clear Anodized
            iii. Essential Flashing System: Starter, Overhang.

1. Finish: Matte black.

d. Dimensions:

1. AWP-1818: 455mm (17-7/8") (h) x 1,818 mm (71-9/16") (l).
2. AWP-3030: 455mm (17-7/8") (h) x 3,030 mm (119-5/16") (l).

e. Panel Thickness: 16 mm (5/8").

f. Weight: AWP-1818: 35.27 lbs. per panel, AWP-3030: 57.32 lbs. per panel.

g. Coverage: 8.88 sq. ft. per panel (1818), 14.81 sq. ft. per panel (3030).

h. Factory sealed on six [6] sides.

C. Substitutions: Approved equal prior to bid.

2.2 MATERIALS

A. Fiber cement panels manufactured from a pressed, stamped, and autoclaved mix of Portland cement, fly ash, silica, recycled rejects, and wood fiber bundles.

B. Panel surface pre-finished and machine applied.

C. Panels profiled along 3030mm edges so that the long joints between the installed panels are ship-lapped.

D. Factory-applied sealant gasket added to top panel edge; all 3030mm edge joints contain a factory sealant.

2.3 PERFORMANCE REQUIREMENTS:

A. Fiber Cement Cladding – Must comply with ASTM C-1186, Type A, Grade II requirements:

1. Wet Flexural Strength: Result: 1418 psi, Lower Limit: 1015 psi.
2. Water Tightness: No water droplets observed on any specimen.
3. Freeze-thaw: No damage or defects observed.
4. Warm Water: No evidence of cracking, delamination, swelling, or other defects observed.
5. Heat-Rain: No crazing, cracking, or other deleterious effects, surface or joint changes observed in any specimen.

B. Mean Coefficient of Linear Thermal Expansion (ASTM E-228): Max 1.0*10^-5 in./in. F.

C. Surface Burning (CAN-ULC S102/ASTM E-84): Flame Spread: 0, Smoke Developed: 0.

D. Wind Load (ASTM E-330): Contact manufacturer for ultimate test pressure data corresponding to framing type, dimensions, fastener type, and attachment clips. Project engineer(s) must determine Zone 4 and 5 design pressures based on project specifics.

1. Minimum lateral deflection: L/120.

E. Water Penetration (ASTM E-331): No water leakage observed into wall cavity.
F. Steady-State Heat Flux and Thermal Transmission Properties Test (ASTM C-518): 16mm thick panel thermal resistance R Value of 0.47.
G. Fire Resistant (ASTM E-119): The wall assembly must successfully endure 60-minute fire exposure without developing excessive unexposed surface temperature or allowing flaming on the unexposed side of the assembly.
H. Ignition Resistance (NFPA 268): No sustained flaming of panels, assembly when subjected to a minimum radiant heat flux of 12.5 kW/m2 ± 5% in the presence of a pilot ignition source for a 20-minute period.
I. Fire Propagation (NFPA 285): Wall assembly of Nichiha AWP, Ultimate Clips and Starter Track, Tyvek Commercial Wrap, ½" Densglass Gold Sheathing, 16" o.c. 18 gauge steel studs, mineral wool in-cavity insulation, and interior 5/8" Type X gypsum met the acceptance criteria of NFPA 285.
J. Fire Propagation (CAN/ULC S-134): Wall assembly of Nichiha AWP, Ultimate Clips and Starter Track, Tyvek Housewrap, 5/8" FRT plywood, 16" o.c. 2x wood studs, fiberglass in-cavity insulation, and interior 5/8" Type X gypsum met the acceptance criteria of CAN/ULC S-134.
K. Drained and Back Ventilated Rainscreen (AAMA 509-14): System classifications: W1, V1.
L. Florida Building Code - Test Protocol HVHZ (TAS 202, 203): Horizontal Application Design Pressure: 95 psf, Vertical Application Design Pressure: 85 psf.

2.4 INSTALLATION COMPONENTS

A. Ultimate Clip System:
    1. Starter Track:
        a. Horizontal Panel Installations - FA 700 – 3,030mm (l) galvalume coated steel.
        b. Vertical Panel Installations (AWP-3030 only) – FA 710T – 3,030mm (l) galvalume coated steel.
    2. Panel Clips: JEL 778 "Ultimate Clip II" (10mm rainscreen for 16mm AWP) – Zinc-Aluminum-Magnesium alloy coated steel.
        a. Joint Tab Attachments (included) – used at all AWP-1818 panel to panel vertical joints, NOT used with AWP-3030 installations.
    3. Corner Clips: JE 777C (10mm rainscreen for 5/8" AWP Manufactured Corners) -- Zinc-Aluminum-Magnesium alloy coated steel.
    4. Single Flange Sealant Backer – FHK 1015 R (10mm) – 6.5' (l) fluorine coated galvalume.

5. Double Flange Sealant Backer – FH 1015 R (10mm) – 10' (l) fluorine coated galvalume.
6. Corrugated Spacer – FS 1005 (5mm), FS 1010 (10mm) – 4' (l).

B. Aluminum Trim (optional): Paint primed trim as specified in finish schedule.

C. Essential Flashing System (optional):
   1. Starter – main segments (3,030mm), inside corners, outside corners
   2. Overhang – main segments (3,030mm), inside corners, outside corners, joint clips

D. Fasteners: Corrosion resistant fasteners, such as hot-dipped galvanized screws appropriate to local building codes and practices must be used. Use Stainless Steel fasteners in high humidity and high-moisture regions. Panel manufacturer is not liable for corrosion resistance of fasteners. Do not use aluminum fasteners, staples or fasteners that are not rated or designed for intended use. See manufacturer's instructions for appropriate fasteners for construction method used.

E. Flashing: Flash all areas specified in manufacturer's instructions. Do not use raw aluminum flashing. Flashing must be galvanized, anodized, or PVC coated.

F. Sealant: Sealant shall comply with ASTM C920, Class 35.

PART III: EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Fiber cement panels can be installed over braced wood, steel studs and sheathing including plywood, OSB, plastic foam (1" or less) or fiberboard sheathing. Fiber cement panels can also be installed over Structural Insulated Panels (SIP's), Concrete Masonry Units (CMU's) and Concrete Block Structures (CBS's) with furring strips, and Pre-Engineered Metal Construction. Insulated Concrete Forms (ICFs) require added measures. Consult with Nichiha Technical Services.

2. Allowable stud spacing: 16" o.c. maximum.

3. A weather resistive barrier is required when installing fiber cement panels. Use an approved weather resistive barrier (WRB) as defined by the 2015 IBC or IRC. Refer to local building codes.

4. Appropriate metal flashing should be used to prevent moisture penetration around all doors, windows, wall bottoms, material transitions and penetrations. Refer to local building codes for best practices.

B. Examine site to ensure substrate conditions are within alignment tolerances for proper installation.

C. Do not begin installation until unacceptable conditions have been corrected.

D. Do not install panels or components that appear to be damaged or defective. Do not install wet panels.

3.2 TOLERANCE

A. Wall surface plane must be plumb and level within +/- ¼ inch in 20 feet in any direction.

1. One layer of Nichiha 5mm (~3/16") Spacer may be used as shim.

3.3 INSTALLATION

A. General: Install products in accordance with the latest installation guidelines of the manufacturer and all applicable building codes and other laws, rules, regulations and ordinances. Review all manufacturer installation, maintenance instructions, and other applicable documents before installation.

1. Consult with your local dealer or Nichiha Technical Department before installing any Nichiha fiber cement product on a building higher than 45 feet or three stories or for conditions not matching prescribed standard installation guide requirements and methods. A Technical Design Review (TDR) process is available to evaluate project feasibility.

2. *Vertical Control/Expansion Joints* are required with AWP-1818, for walls wider than 30 feet, within 2-12 feet of outside corners finished with metal trim *and* approximately every 30 feet thereafter.

A. *Vertical Control/Expansion Joints* are required at each AWP-3030 vertical joint, or H-Mold trim may be used instead.

3. *Horizontal/Compression Joints* are required for multi-story installations of AWP. Locate joints at floor lines. Joints are flashed minimum ½" breaks. Do not caulk. Refer to installation guide(s).

A. Wood framed buildings of three or more floors require a compression joint at each floor.

B. Steel framed buildings (including reinforced concrete core with LGMF exterior walls) of more than three floors (or 45 feet) require a compression joint every 25 feet at a floor line.

B. Panel Cutting

1. Always cut fiber cement panels outside or in a well ventilated area. Do not cut the products in an enclosed area.

2. Always wear safety glasses and NIOSH/OSHA approved respirator whenever cutting, drilling, sawing, sanding or abrading the products. Refer to manufacturer SDS for more information.

3. Use a dust-reducing circular saw with a diamond-tipped or carbide-tipped blade.

a. Recommended circular saw: Makita 7-1/4" Circular Saw with Dust Collector (#5057KB).

b. Recommended blade: Tenryu Board-Pro Plus PCD Blade (#BP-18505).

c. Shears (electric or pneumatic) or jig saw can be used for complicated cuttings, such as service openings, curves, radii and scrollwork.

4. Silica Dust Warning: Fiber cement products may contain some amounts of crystalline silica, a naturally occurring, potentially hazardous mineral when airborne in dust form. Consult product SDS or visit https://www.osha.gov/dsg/topics/silicacrystalline/.

5. Immediately clean dust from cut panels as it may bind to the finish.

3.4 CLEANING AND MAINTENANCE

A. Review manufacturer guidelines for detailed care instructions.

END OF SECTION 074646

# SECTION 075423 – THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Adhered thermoplastic polyolefin (TPO) roofing system.

2. Roof insulation.

3. Field-fabricated roof expansion joints.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.

2. Section 061600 "Sheathing" for wood-based, structural-use roof deck panels.

3. Section 072100 "Thermal Insulation" for insulation beneath the roof deck.

4. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.

5. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

### 1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

### 1.4 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.

2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.

5. Review structural loading limitations of roof deck during and after roofing.

6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.

7. Review governing regulations and requirements for insurance and certificates if applicable.

8. Review temporary protection requirements for roofing system during and after installation.

9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:

1. Base flashings and membrane terminations.

2. Tapered insulation, including slopes.

3. Roof plan showing orientation of steel roof deck and orientation of roofing, fastening spacings, and patterns for mechanically fastened roofing.

4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

D. Samples for Verification: For the following products:

1. Sheet roofing, of color required.

2. Walkway pads or rolls, of color required.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency.

C. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

D. Field quality-control reports.

E. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roofing, base flashings, roof insulation, fasteners, cover boards, roofing accessories, and other components of roofing system.

2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carlisle SynTec Incorporated.

2. Johns Manville; a Berkshire Hathaway company.

3. GAF Everguard.

4. Approved equal prior to bid.

B. Source Limitations: Obtain components including roof insulation and fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.

1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.

2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

D. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 TPO ROOFING

A. Fabric-Reinforced TPO Sheet: ASTM D 6878, internally fabric- or scrim-reinforced, uniform, flexible TPO sheet.

1. Thickness: **80 mils, nominal**.

2. Exposed Face Color: White.

2.4 FIELD-FABRICATED ROOF EXPANSION JOINTS

A. Field-Fabricated Roof Expansion Joints: Provide compressible tube expansion joint covered with TPO cover piece per roofing membrane manufacturer's recommended details.

2.5 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils thick, minimum, of same color as TPO sheet.

C. Bonding Adhesive: Manufacturer's standard.

D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

E. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.

F. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.

G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.6 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by TPO roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Atlas Roofing Corporation.

b. Carlisle SynTec Incorporated.

c. Dyplast Products.

d. Firestone Building Products.

e. GAF Materials Corporation.

f. Hunter Panels.

g. Insulfoam LLC; a Carlisle company.

h. Johns Manville; a Berkshire Hathaway company.

i. Rmax, Inc.

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.7 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion resistance provisions in FM Global 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.

D. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch thick.

1. Basis-of-Design: Subject to compliance with requirements, provide product indicated below by Georgia Pacific Building Products, or a comparable product as approved by the Architect:

a. Product: DensDeck.

2.8 ASPHALT MATERIALS

A. Asphalt Primer: ASTM D 41/D 41M.

2.9 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.

2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

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

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.4 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

G. Mechanically Fastened and Adhered Insulation: Install each layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.

2. Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.

1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.5 ADHERED ROOFING INSTALLATION

A. Adhere roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.

B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

E. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.

F. Apply roofing with side laps shingled with slope of roof deck where possible.

G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.

2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.

3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.6 FIELD-FABRICATED ROOF EXPANSION JOINT INSTALLATION

A. Install field-fabricated roof expansion joints and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Mechanically attach roofing membrane on both sides of the field-fabricated roof expansion joint using manufacturer's recommended fastening system.

C. Cover compressible tube expansion joint with TPO roofing membrane cover piece and adhere to roofing membrane per manufacturer's recommendations.

D. Ensure there is sufficient excess roofing membrane to accommodate building movement.

3.7 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.8 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.

1. Electric Field Vector Mapping (EFVM): Testing agency shall survey entire roof area for potential leaks using electric field vector mapping (EFVM).

B. Flood Testing: Flood test each roofing area for leaks, according to recommendations in ASTM D 5957, after completing roofing and flashing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.

1. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of base flashing.

2. Flood each area for 48 hours.

3. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.

C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.10 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075423

# SECTION 076200 - SHEET METAL FLASHING AND TRIM

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:
1. Manufactured reglets.
2. Formed roof-drainage sheet metal fabrications.
3. Formed steep-slope roof sheet metal fabrications.

### 1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sheet metal flashing and trim.
1. Include plans, elevations, sections, and attachment details.
2. Distinguish between shop- and field-assembled work.
3. Include identification of finish for each item.
4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.

C. Samples: For each exposed product and for each color and texture specified.

### 1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

C. Sample warranty.

### 1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
1. Provide all details required to illustrate industry standard assemblies suitable for intended use and capable of providing a complete, proper, weather proof and water proof installation.
2. Provide details for terminations and corners of parapets, expansion joints, and similar non typical situations.

C. All edge metal flashings and copings associated with roof assemblies shall meet ES-1 and FM I 90 requirements.

D. All flashing and sheet metal shall comply with SMACNA and NRCA standards.

1.7 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:
1. Design Pressure: As indicated on Drawings.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Stainless Steel: ASTM A167, Type 302 or 304, No. 2D, dull finish, 0.018-inch thick, unless otherwise shown.

C. Galvanized Sheet Steel: ASTM A653/A653M, G90, commercial quality copper bearing steel, thickness 0.0217-inch (26 U.S. Standard gauge), unless otherwise shown.

D. Factory-Painted Aluminum Sheet shall conform to ASTM B209 (ASTM B209M), 3003-H14, with a minimum thickness listed below.
   a. 0.040 inch (18 gauge) at all standard gutter/downspout conditions.

E. All exposed edges of sheet metal shall be hemmed.

F. Metal flashing is required at the base of all EIFS applications. Flashing shall be hemmed and form a drip just below the drainage track of the finish system. Refer to 072000 for additional requirements.

G. Metal through wall flashing used in masonry construction shall be prefinished to match the color of the wall assembly and shall extend a minimum of ½" from the face of the wall and form a drip. The exposed edge of all metal through wall flashing shall be hemmed.

H. Preformed drips shall be specified for all exterior doors.

I. Metal flashing shall be factory or shop curved as required by the design and shall be in continuous lengths to the greatest extent possible. Segmented flashing is not an acceptable substitute for factory or shop curved flashing.

J. Architect shall pay close attention to the gauge of material used and the proposed application to minimize oil canning.

K. Aluminum Sheet: , alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
   1. Exposed Coil-Coated Finish:
      a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   2. Color: As selected by Architect from manufacturer's full range.

2.3 UNDERLAYMENT MATERIALS

A. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F (111 deg C); and complying with physical requirements of ASTM D 226/D 226M for Type I and Type II felts.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Atlas Roofing Corporation.
    b. Engineered Coated Products.
    c. Kirsch Building Products, LLC.
    d. SDP Advanced Polymer Products Inc.
    e. Approved equal prior to bid.

B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 BITUMINOUS SHEET FLASHING

A. Acceptable Manufacturers
1. WR Grace and Company
2. Pecora Corporation
3. Polyguard Products
4. Protecto Wrap Company

B. Flashing schedule
1. Masonry Ledges
2. Shelf Angles
3. Lintels
4. Window sills
5. Intersections of masonry sills and masonry walls
6. Continuous perimeter flashing at bottom of all masonry walls level just above finished floor. Walls shall be grouted solid below flashing.

C. Flashing shall be flexible, self-sealing through-wall flashing with a polyethylene facer and paper release sheet.

D. Flashing must be a minimum of 40 mils thick

E. Flashing and all accessories, including but not limited to, primer, tape, and joint sealer shall be manufacturer's standards and procured from a single source.

F. Specify all substrates are to be prepared and primed according to the manufacturers' recommendations.

G. Specify extension of flashings from a point ½ inch behind exterior wall faces, across cavity to back-up surfaces; extend 6 inches minimum up back-up surfaces. At steel shelf angles and lintels extend flashings 4 inches minimum above top of steel. Gwinnett County Facility Construction Standards FLASHING AND SHEET METAL A12-160GSB/12-2012 076000-2

H. Horizontal joints in flashing are not permitted.

I. Require 4" lapped end joints minimum.

J. Require a two (2) year warranty covering defects in materials or workmanship for leakage of water into the building or within the construction.

2.5 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
    c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non sag, nontoxic, non staining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.6 MANUFACTURED REGLETS

A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Cheney Flashing Company.
    b. Fry Reglet Corporation.

c. Heckmann Building Products, Inc.
d. Hickman Company, W. P.
e. Hohmann & Barnard, Inc.
f. Keystone Flashing Company, Inc.
g. Approved equal prior to bid.

2. Material: Aluminum, 0.024 inch (0.61 mm) thick.
3. Finish: With manufacturer's standard color coating.

2.7 ANCILLARY MATERIALS

A. Solder: ASTM B32, alloy composition Sn 50 and Sn 60 for stainless steel.

B. Soldering Flux: ASTM B32, Type RA.

C. Sealer Tape: Polyisobutylene sealer tape.

D. Isolation Paint: ASTM D1187, asphalt.

E. Isolation Tape: Butyl or polyisobutylene, internally reinforced, or 20-mil thick minimum polyester.

F. Plastic Roof Cement: ASTM D4586, Type II.

G. Fasteners:
1. For Galvanized Steelwork: Steel, galvanized per ASTM A153/A153M or stainless steel fasteners.
2. For Zinc or Aluminum Work: Stainless steel or aluminum; reglet fasteners may be galvanized or cadmium-plated steel.
3. For Stainless Steelwork: Stainless steel.
4. Nails: Roofing nailhead, 10-gauge spiral or ring shank, lengths as required to penetrate wood at least 3/4 inch.

2.8 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
1. Obtain field measurements for accurate fit before shop fabrication.
2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

D. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

E. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

## 2.9 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Gutters: Fabricate in uniform section lengths not exceeding , with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.
1. Aluminum Sheet: thick.
2. Gutter Profile: As indicated on drawings and according to SMACNA's "Architectural Sheet Metal Manual."
3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Gutter Supports: Manufacturer's standard supports as selected by Architect with finish matching the gutters.
5. Gutter Accessories: Continuous screened leaf guard with sheet metal frame.
6. Prefinished – Refer to Drawings for Color

B. Downspouts: Non-Corrugated **square** complete with machine-crimped elbows, manufactured from the same metal as gutters. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Formed Aluminum: thick.
2. Prefinished – Refer to Drawings for Color

C. Boots: Provide transition piece from square downspout to round PVC boot. Fit downspouts into boots or drain pipes where indicated; caulk and cement joints neatly. Solder or weld with no flux, all seams. Close tops of downspout heads with a removable type ½" mesh galvanized steel wire mesh.

## 2.10 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
1. Aluminum: thick.

B. Drip Edges: Fabricate from the following materials:
1. Aluminum: thick.

C. Eave, and Rake: Fabricate from the following materials:
1. Aluminum: thick.

## 2.11 WALL SHEET METAL FABRICATIONS

A. Wall Expansion-Joint Cover: Fabricate from the following materials:

1. Aluminum: 0.040 inch thick.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."

G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

## 3.3 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters: Join sections with riveted joints or joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
1. Install gutter with expansion joints at locations indicated, but not exceeding, apart. Install expansion-joint caps.
2. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.

C. Downspouts: Join sections with telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately o.c. Tie downspouts to underground storm drainage system using CPVC “boot”, contractor to coordinate with civil documents.

D. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches in direction of water flow.

## 3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

## 3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend 4 inches beyond wall openings.

## 3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturers written installation instructions.

END OF SECTION 076200

# SECTION 077100 – ROOF SPECIALTIES AND ACCESSORIES

## PART 1 – GENERAL

### 1.1 DESCRIPTION OF WORK

A. This Section covers the major requirements only. The supplying of additional fastenings, accessory features and other items not mentioned specifically herein, but which are necessary to make a complete installation shall also be included.

**B. Roof accessories shall meet the following standards:**
   **1. SMACNA "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap-flashing to coordinate with type of roofing indicated.**
   **2. NRCA "Roofing and Waterproofing Manual" details for installation of units.**

C. Related Work Specified Elsewhere: Refer to all Sections in Division 1, General Requirements.
   1. Division 7 Section “Sheet Metal Flashing and Trim” flashing and trim.
   2. Division 7 Section “Joint Sealants”.

### 1.2 SUBMITTALS

A. General: Submittals shall be in accordance with Specification Section 01 33 00.

B. Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.

C. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.

### 1.3 WARRANTY

A. Manufacturer’s Standard Warranty: Materials shall be free of defects in material and workmanship for a period of five (5) years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge. Electrical motors, special finishes, and other special equipment (if applicable) shall be warranted separately by the manufacturers of those products.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

A. Thybar Corporation, Addison, IL (Basis of Design)
   1. Uni-Curb, Inc., Chicago, IL
   2. Roof Products and Systems Corp., Addison, IL
   3. Or Architect approved equal prior to Bid.

2.2 MATERIALS

A. Pre-fabricated Roof Curbs:
   1. Curbs shall be all aluminum with 90 degree miter corners and built-in cant strips (curbs shall be completely insulated with a minimum of 1-1/2 inch (38 mm) rigid insulation board). Coordinate with roofing manufacturer.
   2. Insulation shall be protected by a 22 gage (U.S. standard) galvanized metal liner.
   3. Pressure Treated Wood nailers shall be firmly attached to the metal curb.
   4. Curb shall have one coat shop-applied rust resistant paint.

B. Pre-fabricated Roof Equipment Base Supports:
   1. Furnish and install equipment base supports, manufactured by Uni-Curb, Inc., Chicago, IL, Thybar Corporation, Addision, Illinois, or Roof Products and Systems Corporation, Addison, Illinois.
   2. Base(s) shall be all steel construction, with continuous base and top plate, completely assembled with arc welded corners.
   3. Pressure Treated Wood nailers shall be firmly attached to the continuous top plate.
   4. Height of base shall be as detailed.
   5. Furnish 18 gage (U.S. standard) galvanized steel cover cap to counter-flash the upturned roofing a minimum of 2 inches.
   6. Furnish and install thermal insulation as shown on the Drawings.
   7. Base shall have one coat shop applied rust resistant paint.

PART 3 – EXECUTION

3.1 INSPECTION

A. Verify that curb installation will not disrupt other trades. Verify that the substrate is dry, clean, and free of foreign matter. Correct defects prior to any installation.

3.2 INSTALLATION

A. Submit product design Drawings for review and approval to the Architect before fabrication.

B. Contractor shall check as-built conditions and verify the manufacturer's details for accuracy to fit the application prior to fabrication. Contractor shall ensure that installer complies with the manufacturer's installation instructions.

C. Contractor shall ensure that installer furnishes mechanical fasteners consistent with the roof requirements.

END OF SECTION 077100

# SECTION 078400 – FIRESTOPPING

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Section, apply to work specified in this section.

### 1.2 DEFINITIONS

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between, fire rated wall and floor assemblies.

### 1.3 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

Only tested firestop systems shall be used in specific locations as follows:

A. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

B. Openings between structurally separate sections of wall or floors.

C. Gaps between the top of walls and ceilings or roof assemblies.

D. Expansion joints in walls and floors.

E. Openings and penetrations in fire-rated partitions or walls containing fire doors.

F. Openings around structural members which penetrate floors or walls.

### 1.4 RELATED WORK OF OTHER SECTIONS

A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:

1. Division 3 Section “Cast-In-Place Concrete”
2. Division 7 Section “Joint Sealants”
3. Division 9 Section “Gypsum Board Assemblies”
4. Division 22 Section “Plumbing”
5. Division 23 Section “HVAC”
6. Division 26 Section “Electrical”
7. Division 28 Section “Fire Alarm and Security”

1.5 REFERENCES

A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops".

B. Test Requirements: UL 1479, "Fire Tests of Through-Penetration Firestops"

C. Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems"

D. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.

1. UL Fire Resistance Directory:
   a. Firestop Devices (XHJI)
   b. Fire Resistance Ratings (BXRH)
   c. Through-Penetration Firestop Systems (XHEZ)
   d. Fill, Voids, or Cavity Material (XHHW)
   e. Forming Materials (XHKU)
   f. Joint Systems (XHBN)
   g. Perimeter Fire Containment Systems (XHDG)

2. Alternate Systems: "Omega Point Laboratories Directory" (updated annually).

E. Test Requirements: ASTM E 1966, "Standard Test Method for Fire Resistive Joint Systems"

F. Test Requirements: ASTM E 2307, "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus"

G. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Fire Stops"

H. ASTM E 84, "Standard Test Method for Surface Burning Characteristics of Building Materials"

I. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments

J. International Building Code: Current Edition

K. NFPA 101 - Life Safety Code

L. NFPA 70 - National Electric Code

1.6 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide through-penetration fire stop systems and fire-resistive joint systems that comply with specified requirements of tested systems.

B. Fire stop System installation must meet requirements of ASTM E 814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed fire stop materials and methods shall conform to applicable governing codes having local jurisdiction.

D. Fire stop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Contractor shall consult the Architect's Structural Engineer prior to penetrating any load bearing assembly.

E. For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgment derived from similar qualified tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

1.7 SUBMITTALS

A. General: Submittals shall be in accordance with Specification Section 01 33 00.

B. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of qualified tested firestop systems to be used and manufacturer's installation instructions.

C. Manufacturer's engineering judgment identification number and document details when no qualified tested system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in document.

D. Submit material safety data sheets provided with product delivered to job-site.

1.8 INSTALLER QUALIFICATIONS

A. Contractor to engage an experienced installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an installer engaged by the Contractor does not in itself confer qualification on the buyer.

**B. Single-Source Responsibility: All fire stopping to be performed by a single contractor who procures all fire stopping materials from a single source.**

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

A. Do not use materials that contain flammable solvents.

B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

**1.11 WARRANTY**

**A. Provide manufacturer's standard warranty covering fire stopping materials.**

**C. Provide applicator's standard warranty covering workmanship for a period of one (1) year following substantial completion.**

**1.12 SYSTEM PERFORMANCE REQUIREMENTS**

**A. General: Provide fire stopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases as required by code.**

**B. Provide through-penetration fire stop systems with F ratings as determined per ASTM E 814/UL1479, but not less than that equaling or exceeding the fire resistance rating of the constructions penetrated.**

**C. Provide joint sealants with fire-resistance as determined per ASTM E 1966/UL 2079, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.**

**D. For fire stopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.**
**1. For piping penetrations for plumbing and wet-pipe sprinkler systems, specify moisture-resistant through-penetration fire stop systems.**
**2. For penetrations involving insulated piping, specify through-penetration fire stop systems not requiring removal of insulation.**

**E. For fire stopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450, as determined per ASTM E 84**

**1.13 TEST CRITERIA**

**A. Specify the materials listed above or approved equals shall meet the criteria herein.**

**B. Deflection: When tested in accordance with ASTM E759, the material shall not crack or delaminate when the non-concrete topped galvanized deck to which it is applied is subjected to a one time vertical centerload resulting in a downward deflection of 1/120th of the span.**

**C. Bond Impact: When tested in accordance with ASTM E760, the material shall not crack or delaminate from the concrete topped galvanized deck to which it is applied.**

**D. Cohesion/Adhesion (bond strength): When tested in accordance with ASTM E736, the material applied over uncoated or galvanized steel shall have an average bond strength of 150 psf.**

**E. Air Erosion: When tested in accordance with ASTM E859, the material shall not be subject to losses from the finished application greater than 0.025 grams per sq. ft. (0.27 grams per square meter).**

**F. Compressive Strength: When tested in accordance with ASTM E761, the material shall not deform more than 10 percent when subjected to a crushing force of 750 psf (35.9 kPa).**

**G. Corrosion Resistance: When tested in accordance with ASTM E937, the material shall not promote corrosion of steel.**

**H. Non-combustibility: When tested in accordance with ASTM E136 or CAN4-S114, the material shall be non-combustible.**

**I. Surface Burning Characteristics: When tested in accordance with ASTM E84 or CAN4-S102, the material shall exhibit the following surface burning characteristics:**
1. **Flame Spread 0**
2. **Smoke Developed 0**

**J. Density: When tested in accordance with ASTM E605, the material shall meet the minimum individual and average density values as listed in the appropriate UL/ULC design or as required by the authority having jurisdiction, or shall have a minimum average of 15 pcf (240 kg/m3).**

**1.14. INTUMESCENT FIRE PROTECTION SYSTEM**

**A. Intumescent fire resistive material shall have been tested in**

**accordance with the procedures of UL 263 or ASTM E119 or CAN/ULC-S101, and reported by Underwriters Laboratories, Inc. or Underwriters Laboratories of Canada only.**

**B. Thin-Film Fire-Resistive Intumescent Mastic Coating shall be a Factory-mixed formulation.**

**C. Water-Based Formulation shall be approved by manufacturer and authorities having jurisdiction for indicated use.**

**D. Verify with manufacturer that products specified and selected are suitable for all intended uses.**

**E. UL Fire Tested Designs Only based on UL 263 (ASTM-E119).**

**F. No mesh is permitted.**

**G. Application of intumescent fire protection shall occur at exposed structural steel columns, diagonal braces, beams and all associated structural steel components as required by and applicable to the International Building Code.**

**1.15. DECORATIVE TOPCOATING**

**A. Topcoat materials shall be as required for color-coding, aesthetics or additional surface protection, approved by the thin-film fire resistive material manufacturer and applied in full accordance with the coating manufacturer's written instructions.**

PART 2 – PRODUCTS

2.1 FIRESTOPPING – GENERAL

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

C. Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

1. F-Rating: Not less than the fire-resistance rating of the wall construction being penetrated.

D. Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

1. F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
2. T-Rating: when penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.

E. Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.

F. Mold Resistance: Provide penetration firestoppping with mold and mildew resistance rating of 0 as determined by ASTM G21.

G. **Further Requirements**

**1. Spray-applied fire resistive materials shall be applied at the required thickness and density to achieve the following ratings:**
**a. Composite Floor System (Spray Beams Only) 1 hour**
**b. Metal Decking at bottom of roof trusses) 1 hour**
**2. Potable water shall be used for the application of spray-applied fire resistive materials.**
**3. Spray-applied fire resistive materials shall be free of all forms of asbestos, including actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite. Material manufacturer shall specify certification of such upon request.**
**4. Primers shall be approved by manufacturer and applied in full accordance with the primer manufacturer's written instructions.**
**5. Compatibility: Provide fire stopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the fire stopping under conditions of service and application, as demonstrated by fire stopping manufacturer based on testing and field experience.**
**6. Accessories: Provide components for each fire stopping system that are needed to install fill materials and to comply with "System Performance Requirements" article in Part 1. Use only components specified by the fire stopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:**
**a. Permanent forming/damming/backing materials including the following:**
**i. Semi refractory fiber (mineral wool) insulation.**
**ii. Ceramic fiber.**
**iii. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.**
**iv. Fire-rated form board.**
**v. Joint fillers for joint sealants.**
**b. Temporary forming materials.**
**c. Substrate primers.**
**d. Collars.**
**e. Steel sleeves.**
**7. Applications: Provide fire stopping systems composed of materials specified in this Section that comply with system performance and other requirements.**

2.2 FIREPROOFING MANUFACTURERS

A. Provide products of the following manufacturers as identified below:

1. The spray-applied fire resistive material shall be manufactured by:
   a. ISOLATEK INTERNATIONAL
   b. W. R. GRACE CONSTRUCTION PRODUCTS
   c. Hilti, Inc., Tulsa, Oklahoma
      800-879-8000
      www.us.hilti.com
   d. Or Architect approved equal.

2. Intumescent fire protection materials
   a. CAFCO® BLAZE-SHIELD® II, Isolatek International (basis of design)
   b. CAFCO® 300, Isolatek International
   c. Monokote® MK-6, W. R. Grace

**2.3 FIRESTOPPING MATERIALS**

**A. Acceptable manufacturer: Tremco, Inc.**

**B. Proprietary Product(s)/System(s): Tremco Firestop Systems Products.**
**1. TREMstop IA+ High Performance Intumescent Acrylic Sealant**
**2. TREMstop Acrylic Flexible Acrylic Sealant**
**3. TREMstop Acrylic - SP Sprayable, Flexible Acrylic Sealant**
**4. Fyre-Sil Fire Resistant Silicone Sealant**
**5. Fyre-Sil S/L Self-Leveling Fire Resistant Silicone Sealant**
**6. Dymeric 240/240FC Two Part Urethane Sealant**
**7. Dymonic One Part Modified Polyurethane Sealant**
**8. THC 900 Multi-Component Chemically Curing Polyurethane Sealant**
**9. TREMstop Fire Mortar Trowelable Firestop Mortar**
**10. TREMstop MCR Flexible Metal Restricting Collar for Wrap Strips**
**11. TREMstop MP Moldable Putty Pad for Electrical Outlet Boxes**
**12. TREMstop SuperStrip Flexible Intumescent Strip**

**C. Product(s)/System(s) Testing: UL Fire Resistance Directory, *Fill, Void or Cavity Materials (XHHW)* and *Firestop Devices (XHJI)* for listed product(s)/system(s).**

2.4 MATERIALS

A. Use only firestop products that have been UL 1479, ASTM E 814 or UL 2079 tested for specific firerated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Pre-installed firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors and/or gypsum walls.

C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:

1. Hilti Intumescent Firestop Sealant (FS-ONE) (Basis of Design)
2. Hilti Flexible Firestop Sealant (CP 606)
3. Or Architect approved equal.

D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti Flexible Firestop Sealant (CP 606) (Basis of Design)
2. Hilti Intumescent Firestop Sealant (FS-ONE)
3. Or Architect approved equal.

E. Sealants and caulking materials for use with fire-rated construction joints and other gaps, the following products are acceptable:

1. Hilti Flexible Firestop Sealant (CP 606) (Basis of Design)
2. Or Architect approved equal.

F. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.

1. Hilti Speed Plugs (CP 777) (Basis of Design)
2. Hilti Speed Strips (CP 767)
3. Or Architect approved equal.

G. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:

1. Hilti Intumescent Firestop Sealant (FS-ONE) (Basis of Design)
2. Or Architect approved equal.

H. Intumescent sealants or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti Intumescent Firestop Sealant (FS-ONE) (Basis of Design)
2. Hilti Flexible Firestop Sealant (CP 606)
3. Or Architect approved equal.

I. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:

1. Hilti Firestop Putty Pad (CP 617) (Basis of Design)
2. Hilti Firestop Box Insert
3. Or Architect approved equal.

J. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:

1. Hilti Firestop Collar (CP 643N) (Basis of Design)
2. Hilti Firestop Collar (CP 644)
3. Or Architect approved equal.

K. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.

L. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction joint assembly.

PART 3 – EXECUTION

3.1 PREPARATION

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.
2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
5. Do not proceed until unsatisfactory conditions have been corrected.

3.2 COORDINATION

A. Coordinate construction of openings, penetrations and construction joints to ensure that the fire stop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through penetration fire stop systems. Coordinate construction and sizing of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

C. Coordinate fire stopping with other trades so that obstructions are not placed in the way prior to the installation of the fire stop systems.

D. Do not cover up through-penetration fire stop and joint system installations that will become concealed behind other construction until each installation has been examined by the building inspector, per requirements of Section 109, International Building Code 2000, ed.

3.3 INSTALLATION

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through penetration and construction joint materials.

1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
2. Consult with Architect's Mechanical Engineer and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
3. Protect materials from damage on surfaces subjected to traffic.

K. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.

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END OF SECTION 078400

# SECTION 079200 – JOINT SEALANTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Latex joint sealants.

### 1.2 PRECONSTRUCTION TESTING

A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples: For each kind and color of joint sealant required.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

### 1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Preconstruction compatibility and adhesion test reports.

C. Preconstruction field-adhesion test reports.

D. Field-adhesion test reports.

E. Warranties.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

B. Preinstallation Conference: Conduct conference at Project site.

**C. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.**

**D. Applicator Qualifications: Company specializing in performing work of this section with minimum three years documented experience, minimum three successfully completed projects of similar scope and complexity, and approved by manufacturer.**

1.6 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period. Provide signed copies.

1. Warranty Period: 3 years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period. Provide signed copies.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

**A. Silicone sealants shall be provided for joints exposed to UV Light or joints subject to movement or joints intended to provide a weatherproof seal. Urethane sealants are not permitted to be used for these applications.**

**B. All joints in new construction requiring sealant shall be provided with a non-adhesive backer rod.**

**C. All sealed joints shall be coordinated with other materials as required by the design to be compatible with the applicable construction.**

D. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. **Tremco Sealant/Weatherproofing Division of RPM International, Inc.**
b. Approved equal prior to bid.

2. Type: Single component (S) or multicomponent (M).

3. Grade: Pourable (P) or nonsag (NS).

4. Class: 100/50.

5. Uses Related to Exposure: Nontraffic (NT).

2.2 LATEX JOINT SEALANTS

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Tremco Incorporated.
b. Approved equal prior to bid.

2.3 JOINT SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

**2.5 URETHANE SEALANTS**

**A. Multi-Component Urethane: ASTM C920, Type M, Grade NS, Class 50; Uses T, NT, M, A, and O; two component, chemical curing, nonstaining, nonbleeding, color as selected.**
   **1. Dymeric 240FC**

**B. Single Component Urethane: ASTM C 920, Type S, Grade NS, Class 100/50, Uses NT, M, A, O; single component, moisture curing, nonstaining, non-bleeding, color as selected.**
   **1. Dymonic FC**
   **2. Dymonic.**
   **3. Vulkem 116.**
   **4. Vulkem 45.or Vulkem 45 SSL**

**C. Multi-Component Self-Leveling Urethane: ASTM C920, Type M, Grade P, Class 25, Uses T; self leveling, multi-component, chemical curing, nonstaining, nonbleeding, color as selected.**
   **1. THC 900.**
   **2. THC 901.**
   **3. Vulkem 45 SSL + Catalyst ( water = catalyst)**

**D. Single Component Self-Leveling Urethane: ASTM C920, Type S, Grade P, Class 100/50; self leveling, single component, moisture curing, nonstaining, nonbleeding, color as selected, green concrete acceptable.**
   **1. Vulkem 45 SSL.**

**2.6 SILICONE SEALANTS**

**A. Multi-Component Silicone: ASTM C920, Type M, Grade NS, Class 50; Uses NT, M, G, A and O: multi-component, neutral curing, nonstaining, nonbleeding, color as selected**
   **1. Spectrem 4-TS.**

**B. Single Component Silicone: ASTM C920, Type S, Grade NS, Class 50; Uses NT, M, G, A and O: single component, neutral curing, nonstaining, nonbleeding, color as selected.**
   **1. Spectrem 1.**
   **2. Spectrem 2.**
   **3. Spectrem 3.**

**C. Single Component Silicone: ASTM C920, Type S, Grade NS, Class 25; Uses NT, G, A and O: single component, neutral, nonstaining, nonbleeding, color as selected.**
   **1. Proglaze.**
   **2. Tremsil 200.**
   **3. Tremsil 600.**

**D. Single Component Traffic Silicone: Low modulus, high performance, single component, self leveling sealant.**
   **1. Spectrem 800.**
   **2. Specterm 900SL.**

**2.7. OTHER SEALANTS**

**A. Latex Sealant: ASTM C 834; single component, solvent curing, nonstaining, nonbleeding, nonsagging; color as selected.**
**1. Tremflex 834.**

**B. Synthetic Rubber Sealant:**
**1. Acoustical Sealant.**

**C. Butyl Sealant: ASTM C 1311, butyl or polyisobutylene, single component, nondrying, non-skinning, non-curing.**
**1. Butyl Sealant.**

**2.8 ACCESSORIES**

**A. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.**

**B. Primer: Non-staining type, recommended by sealant manufacturer to suit application.**

**C. Joint Backing: Round foam rod compatible with sealant; oversized 25 to 50 percent larger than joint width; recommended by sealant manufacturer to suit application**

**D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.**

**E. Masking Tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.**

**2.9. SCHEDULE – SEALANT JOINTS**

**A. Exterior Sealant Joint [Type A]:**
1. **Applications:**
   a) **Control and expansion joints in cast-in-place concrete.**
   b) **Joints between architectural precast concrete units.**
   c) **Control and expansion joints in unit masonry.**
   d) **Joints between different materials listed above.**
   e) **Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.**
   f) **Control and expansion joints in soffits and overhead surfaces.**
   g) **Other exterior joints in vertical surfaces and non-traffic horizontal surfaces for which no other sealant is specified.**
2. **Multi-Component Urethane Sealants:**
   a) **Dymeric 240FC.**
3. **Single Component Urethane Sealants:**
   a) **Dymonic FC.**
   b) **Dymonic.**
   c) **Vulkem 116.**
4. **Multi-Component Silicone Sealants:**

a) **Spectrem 4-TS.**

5. **Single Component Silicone Sealants:**
   a) **Spectrem 1.**
   b) **Spectrem 2.**
   c) **Spectrem 3.**

B. **Interior Sealant Joint [Type B]:**
   1. **Applications:**
      a) **Control and expansion joints on exposed interior surfaces of exterior walls.**
      b) **Perimeter joints on exposed interior surfaces of exterior openings.**
      c) **Perimeter joints between interior wall surfaces and frames of interior doors, windows, storefronts, louvers, elevator entrances and similar openings.**
      d) **Other interior joints in vertical surfaces and non-traffic horizontal surfaces subject to movement for which no other sealant is specified.**
   2. **Multi Component Urethane Sealants:**
      a) **Dymeric 240/240FC.**
   3. **Single Component Urethane Sealants:**
      b) **Dymonic FC.**
   4. **Single Component Silicone Sealants:**
      a) **Spectrem 1.**
      b) **Spectrem 2.**
      c) **Spectrem 3.**
   5. **Other Sealants:**
      a) **Tremflex 834.**

C. **Traffic Sealant Joint [Type C]:**
   1. **Applications:**
      a) **Control, expansion and isolation joints in cast-in-place concrete.**
      b) **Tile control and expansion joints.**
      c) **Joints between different materials listed above.**
      d) **Other interior and exterior traffic bearing joints in horizontal and sloped traffic surfaces**
   2. **Multi Component Urethane Sealants:**
      a) **THC-900/901, self leveling.**
      b) **Vulkem 116 plus catalyst.(Vulkem 227)**
      c) **Vulkem 45 SSL plus catalyst**
   3. **Single Component Urethane Sealants:**
      a) **Vulkem 45, self leveling.**
      b) **Vulkem 45 SSL, semi self leveling.**
   4. **Single Component Silicone Sealants:**
      a) **Spectrem 800.**
      b) **Spectrem 900SL.**

D. **Interior Sanitary Sealant Joint [Type D]:**
   1. **Applications:**
      a) **Joints in toilet room and bathroom counter tops.**
      b) **Joints between plumbing fixtures and adjacent materials.**
      c) **Other interior joints in wet areas where needed to limit mold and mildew growth.**

**2. Single Component Silicone Sealants:**
**a) Tremsil 200.**

**E. Concealed Metal Lap Sealant Joint [Type E]:**
**1. Applications:**
**a) Concealed lap and hook joints in sheet metal flashing and trim.**
**2. Single Component Non-Curing Sealants:**
**a) Tremco Butyl Sealant.**
**b) Tremco Acoustical Sealant.**

**F. Concealed Bedding Sealant Joint [Type F]:**
**1. Applications:**
**a) Bedding joints under metal thresholds and saddles.**
**b) Bedding joints between sheet metal flashing and other materials.**
**2. Single Component Urethane Sealants:**
**a) Dymonic FC.**
**b) Dymonic.**
**c) Vulkem 116.**
**3. Single Component Silicone Sealants:**
**a) Proglaze.**
**b) Spectrem 2.**
**c) Spectrem 3.**
**4. Single Component Non-Curing Sealants:**
**a) Tremco Butyl Sealant.**
**b) Tremco Acoustical Sealant.**

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by

such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

F. Acoustical Sealant Installation: Comply with ASTM C 919 and with manufacturer's written recommendations.

G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:
    a. Perform 10 tests for the first 1000 feet (300 m) of joint length for each kind of sealant and joint substrate.
2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal surfaces.

1. Joint Locations:
    a. Control and expansion joints in unit masonry.
    b. Joints between metal panels.
    c. Perimeter joints between materials listed above and frames of doors, windows and louvers.
    d. Control and expansion joints in ceilings and other overhead surfaces.
    e. Other joints as indicated.
2. Joint Sealant: Silicone.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.

1. Joint Locations:
    a. Perimeter joints between materials listed above and frames of doors, windows and louvers.
    b. Control and expansion joints in ceilings and other overhead surfaces.
    c. Other joints as indicated.
2. Joint Sealant: Silicone.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal surfaces.

1. Joint Locations:
    a. Control and expansion joints on exposed interior surfaces of exterior walls.
    b. Perimeter joints of exterior openings where indicated.
    c. Tile control and expansion joints.
    d. Vertical joints on exposed surfaces of partitions.
    e. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.
    f. Other joints as indicated.
2. Joint Sealant: Latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal surfaces.

1. Joint Sealant Location:
    a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    b. Tile control and expansion joints where indicated.
    c. Other joints as indicated.
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

# SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes hollow-metal including work for hollow metal door and frames.

### 1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required.

E. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

### 1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

### **1.5 QUALITY ASSURANCE**

**A. AWI Quality Standard: "Architectural Woodwork Quality Standards" of the Architectural Woodwork Institute for grade of door, core, construction, finish, and other requirements.**

**B. Fire-Rated Wood Doors: Specify wood doors that comply with NFPA 80; are identical in materials and construction to units tested in door and frame assemblies per ASTM E 152; and are labeled and listed by UL, Warnock Hersey, or another testing and inspection agency acceptable to authorities having jurisdiction.**

**C. Single-Source Responsibility: doors required from one source and by a single manufacturer including non-rated and rated doors.**

**D. Door Manufacturer's Warranty: Provide a written agreement submitted on door manufacturer's standard form with an agreement to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch (6.35 mm) in a 42-by-84-inch (1067-by-2134-mm) section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span, or do not conform to tolerance limitations of referenced quality standards. Warranty shall be in effect during the following period of time after date of Substantial Completion. Solid Core Interior Door warranty shall be for the life of the installation.**

**E. Provide all rated doors and frames labeled according to listing requirements of Underwriter's Laboratories (UL).**

**F. Provide one of the acceptable manufacturers standard core materials according to SDI standards:**
**1. Vertical steel stiffeners.**
**2. Honeycomb**
**3. Polystyrene**

**G. Clearances for hollow metal doors and frames:**
**1. Jamb and Head: 1/8 inch, except not more than 1/4 inch**
**2. Between non-fire-rated pairs of doors. Not more than 3/4 inch at bottom. For fire doors, specify clearances according to NFPA 80.**

**H. Exposed Fasteners: Provide countersunk flat or oval heads for exposed screws and bolts.**

**I. Thermal-Rated (Insulating) Assemblies: Provide doors fabricated as thermal insulating door and frame assemblies at all exterior locations and as required to meet the design intent. Doors shall be tested according to ASTM C 236 or ASTM C 976.**

**J. Hardware Preparation: Provide doors and frames prepared to receive hardware. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.**

**K. All doors and frames shall be reinforced to receive surface-applied hardware.**

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Curries Manufacturing.

2. The Ceco Corp.
3. Mesker Industries, Inc.
4. Pioneer Industries.
5. Republic Steel Corp.
6. Steelcraft Manufacturing Co.
7. Premier Steel Doors and Frames
8. Amweld Building Products, Inc.
9. Approved equal prior to bid.

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

2.3 INTERIOR DOORS AND FRAMES

A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches (44.5 mm).
    c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm).
    d. Edge Construction: Model 1, Full Flush.
    e. Core: Manufacturer's standard.

3. Frames:

    a. Materials: Uncoated, steel sheet, minimum thickness of 0.053 inch (1.3 mm).
    b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2. At all exterior door locations.

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches (44.5 mm).
    c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch (1.0 mm), with minimum A40 (ZF120) coating.

d. Edge Construction: Model 1, Full Flush.
e. Core: Manufacturer's standard insulation material.

3. Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than R= 1.4(U=0.70) when tested according to ASTM C 1363. Door to conform to requirements for Climate Zone 3 from the International Energy Conservation code.
4. Frames:

   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) coating.
   b. Construction: Full profile welded.

5. Exposed Finish: Prime.

## 2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

## 2.6 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

F. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).

I. Glazing: Section 08 80 00 "Glazing."

J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

## 2.7 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
4. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:

1) Two anchors per jamb up to 60 inches high.
2) Three anchors per jamb from 60 to 90 inches high.
3) Four anchors per jamb from 90 to 120 inches high.
4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

1) Three anchors per jamb up to 60 inches high.
2) Four anchors per jamb from 60 to 90 inches high.
3) Five anchors per jamb from 90 to 96 inches high.
4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.

c. Compression Type: Not less than two anchors in each frame.
d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.

a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
3. Provide loose stops and moldings on inside of hollow-metal work.
4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

## 2.8 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: SDI A250.10.

2.9 ACCESSORIES

A. Louvers: Provide sightproof louvers for interior doors, where indicated, which comply with SDI 111C, with blades or baffles formed of 0.020-inch thick, cold-rolled steel sheet set into 0.032-inch thick steel frame.

1. Fire-Rated Automatic Louvers: Movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

**2.10 FURTHER REQUIREMENTS (IN CASE OF A CONFLICT, THE FOLLOWING ARE TO TAKE PRECEDENCE)**

**A. HOLLOW METAL DOORS**

**1. Materials shall meet the following requirements.**
   **a. M A366A 366M or hot rolled, pickled and oiled steel conforming to ASTM A 569/A 569M. Steel shall be free of scale, pitting, coil breaks or other surface blemishes. Steel shall also be free of buckles, waves or any other defects caused by the use of improperly leveled sheets.**
   **b. Exterior Doors: Face sheets shall be 14 gauge minimum thickness and shall have a zinc coating applied by the hot-dip process conforming to ASTM A 653/A 653/M. All exterior doors shall be insulated.**
   **c. Interior Doors: Face sheets shall be 16 gauge minimum thickness. Where scheduled, face sheets of interior doors shall have a zinc coating conforming to ASTM A 653/A 653/M (A60).**
   **d. ASTM A167, Type 316 stainless steel.**

**2. Specify that construction of hollow metal doors shall be as follows:**
   **a. Door thickness shall be 1 3/4".**
   **b. Doors shall be neat in appearance and free from warpage and buckle. All edge bends shall be true and straight and of minimum radius for the material used.**
   **c. Door face sheets shall be joined at their vertical edges.**
   **d. Door edges shall be joined by internally applied tack welds no more than 6" on center extending the full height of the door. There shall be a visible seam at both edges of the door.**
   **e. Top and bottom edges of all doors shall be closed with continuous recessed steel channels no less than 16 gauge thickness, spot welded to both face sheets.**
   **f. Exterior doors shall have an additional flush closing channel at the top edge. Where required for specified hardware, the bottom edge of exterior doors shall have an additional flush closing channel. Opening shall be specified in the bottom closure channel of exterior doors to permit the escape of entrapped moisture.**

**g. Edge profiles shall be specified on both vertical edges of door as follows:**
**i. Single-acting doors – beveled 1/8" in 2"**
**ii. Double-acting doors – rounded on 2-1/8" radius**
**h. All hardware for single-acting doors shall be designed for beveled edges.**
**i. Hardware reinforcements:**
**i. Specify that doors shall be prepared in the factory to receive all hardware specified and approved by the County and to be in accordance with templates specified by the hardware supplier.**
**ii. Minimum thicknesses of hardware reinforcements shall be as follows:**
**a) Full mortise hinges & pivots: 10 gauge**
**b) Lock fronts, flush bolts, closers: 14 gauge**
**c) For all other Surface-mounted hardware: 16 gauge**
**j. Glass moldings and stops:**
**i. If doors contain glass panels, doors shall be specified with flush moldings to secure glazing by others, in accordance with glass sizes and thicknesses shown on approved drawings.**
**ii. Fixed molding shall be securely welded to the door on the security side.**
**iii. Removable glass stop shall be no less than 20 gauge channel, with butted corner joints, and secured with #6 cadmium or zinc-plated countersunk sheet metal screws spaced 10" o.c. maximum.**
**iv. Require that the metal surfaces to which glazing stops are secured and the inside of the glazing stops be chemically treated for maximum paint adhesion and painted with a rust inhibitive primer prior to installation in the door.**
**v. Snap on moldings and surface applied light kits are not permitted.**
**k. Louvers shall be factory installed flush type, and louver vanes shall be of the inverted vee type design. Louver vanes and louver channel shall be 18 gauge minimum thickness.**
**l. Insect screens and/or bird screens shall be specified on louvered doors in exterior locations.**
**m. At rated doors requiring louvers, specify a factory installed listed fire rated fusible link louver.**

**B. HOLLOW METAL FRAMES**

**1. Materials for hollow metal frames shall comply with the following standards:**
**a. Specify that frames be constructed of commercial quality, cold rolled steel conforming to ASTM A 366/A 366M or hot-rolled pickled and oiled steel conforming to ASTM A 569/A 569M.**
**b. Steel for exterior openings shall be 14 gauge, and shall have a zinc coating applied by the hot-dip process conforming to ASTM A 653/A 653M (A60).**
**c. Steel for interior openings shall be 16 gauge.**
**d. Steel for exterior openings subject to abuse shall be 14 gauge.**
**2. Construction:**
**a. All Hollow metal frames may be either knockdown for renovations and retrofits or welded type for new construction according to the design intent, with integral stops and trim.**
**b. All door frames in masonry construction shall be fully grouted.**
**c. Corner joints at welded corners shall have all contact edges closed tight, with faces mitered and continuously welded. Stops shall be butted.**

**d. Minimum height of stops shall be 5/8".**
**e. Hollow metal frames for multiple openings shall have mullion members.**
**f. Door Silencers: Except on weather stripped frames, all doors shall have 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.**
**g. Plaster Guards: Specify minimum 0.0179-inch- (0.45-mm-) thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.**
**h. Hardware reinforcements:**
  **i. Specify that frames shall be prepared in the factory to receive all hardware specified and approved by the County and in accordance with templates specified by the hardware supplier.**
    **a) Frames prepared for anchor hinges shall be reinforced only. Drilling and tapping of mounting holes shall be done in the field by the hardware installer.**
  **ii. Minimum thickness of hardware reinforcing shall be as follows:**
    **a) Hinge: 7 gauge x 1 –1/2" x 10" in length**
    **b) Strike reinforcements: 12 gauge or 16 gauge extrusion**
    **c) Flush bolt reinforcements: 12 gauge**
    **d) Closer reinforcements: 12 gauge**
    **e) Surface applied hardware reinforcements: 12 gauge**
**k. Floor Anchors:**
  **i. Floor anchors shall be specified with two holes. Fasteners shall be secured welded inside each jamb for anchorage to floor.**
  **ii. Material thickness of floor anchors shall be 16 gauge.**
  **iii. Floor anchors are not required for existing wall conditions. An additional frame anchor shall be specified in lieu of a floor anchor.**
**l. Jamb Anchors:**
  **i. Frames for installation in masonry walls shall be specified with adjustable jamb anchors of the T-strap or strap and stirrup type no less than 16 gauge; or wire type no less than 0.156" in diameter. Straps shall be no less than 2' x 10" in size, either perforated or corrugated. The number of anchors specified on each jamb shall be as follows:**
    **a) Frames up to 60" height: 2 anchors**
    **b) Frames greater than 60" up to 90" : 3 anchors**
    **c) Frames greater than 90" up to 96": 4 anchors**
    **d) Frames greater than 96" shall have 4 anchors plus one for each 24" or fraction thereof over 96", spaces 24" maximum between anchors.**
  **ii. Welded frames for installation in stud partition shall be specified with 18 gauge steel anchors, secured inside each jamb as follows:**
    **a) Frames up to 60" height: 2 anchors**
    **b) Frames greater than 60" up to 90": 4 anchors**
    **c) Frames greater than 90" up to 96": 5 anchors**
    **d) Frames greater than 96" shall have 5 anchors plus one for each 24" or fraction thereof over 96", spaces 24" maximum between anchors.**
  **iii. Frames for installation in pre-finished concrete, masonry or steel**

**openings shall be specified with anchoring system of suitable design and quality. Fasteners for such anchors shall be specified as recommended by the manufacturer.**

**iv. Knock down frames shall be specified with a single adjustable tension anchor in each jamb and provision secure attachment of each jamb base to stud runners.**

**v. The Architect shall verify anchor requirements with all UL listed frames prior to final specification.**

**m. Mortar guard shall be 26 gauge steel and shall be welded in place at all hardware mortises on frames to be set in masonry or concrete openings.**

**i. Mortar guards are not be required at hardware preparations in frames for drywall partitions.**

**n. All welded frames shall be specified with a temporary steel spreader welded to the bottom of jambs to serve as bracing during shipping and handling.**

**o. Removable Glazing Stops:**

**i. Removable glass stops shall be no less than 20 gauge channel, with butted corner joints, and secured with #6 cadmium or zincplated countersunk sheet metal screw spaced 10" o.c. maximum.**

**ii. The frames underneath the glazing stops and the inside of the glazing stop shall be treated for maximum paint adhesion and painted with a rust inhibitive primer prior to installation in the frame.**

**3. Clearances for hollow metal doors and frames:**

**a. Jamb and Head: 1/8 inch, except not more than 1/4 inch**

**b. Between non-fire-rated pairs of doors. Not more than 3/4 inch at bottom. For fire doors, specify clearances according to NFPA 80.**

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install door silencers in frames before grouting.
d. Remove temporary braces necessary for installation only after frames have been properly set and secured.

e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
f. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

   a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

   a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
   b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).
   c. At Bottom of Door: [3/4 inch (19.1 mm)] [5/8 inch (15.8 mm)] plus or minus 1/32 inch (0.8 mm).
   d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

C. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

## 3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

# SECTION 081416 - FLUSH WOOD DOORS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Section 08 80 00 "Glazing" for glass view panels in flush wood doors.

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of door. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts and louvers.
5. Requirements for veneer matching.
6. Doors to be factory finished and finish requirements.
7. Fire-protection ratings for fire-rated doors.

C. Samples: For factory-finished doors.

### 1.3 INFORMATIONAL SUBMITTALS

A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

### 1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is a certified participant in AWI's Quality Certification Program

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Algoma Hardwoods, Inc.
2. Ampco.
3. Chappell Door Co.
4. Graham Wood Doors; an Assa Abloy Group company.
5. Lambton Doors.
6. Marshfield Door Systems, Inc.
7. Mohawk Doors; a Masonite company.
8. VT Industries, Inc.
9. Approved equal prior to bid.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards.

1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.

C. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.

D. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.
2. Extra Heavy Duty: public toilets, janitor's closets, patient rooms, exits and assembly spaces.
3. Standard Duty: Closets (not including janitor's closets) and where indicated.

E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

F. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.
   a. Screw Withdrawal, Face: 700 lbf (3100 N).
   b. Screw Withdrawal, Edge: 400 lbf (1780 N).

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Custom (Grade A faces).
2. Species: **WD-1**.
3. Cut: Plain Sliced
4. Assembly of Veneer Leaves on Door Faces: **Random, must be continuous length from bottom of door to top of door, gain lines to run vertical. Wood to achieve a vertical stripe look on door face. Wood stripes to be equal width.**
5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
6. Core: Glued wood stave lumber.
7. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.

2.4 LIGHT FRAMES AND LOUVERS

A. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated.

C. Metal Louvers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Air Louvers, Inc.
   b. Anemostat; a Mestek company.
   c. L & L Louvers, Inc.
   d. Louvers & Dampers, Inc.; a division of Mestek, Inc.
   e. McGill Architectural Products.
   f. Approved equal prior to bid.

2. Metal and Finish: Extruded aluminum with, Class II, color anodic finish, AA-M12C22A32/A34.

2.5 FABRICATION

A. Factory machine doors for hardware that is not surface applied.

B. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00 "Glazing."
3. Louvers: Factory install louvers in prepared openings.

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory finish doors that are indicated to receive transparent finish.

C. Transparent Finish:

1. Grade: **Custom. Exposed visible knots. Fill knots with epoxy as required.**
2. Finish: **Two coats 2000 Water based Polyurethane.**
3. Staining: **Two coats natural sealer with whitener.**
4. Effect: **Open-grain finish.**
5. Sheen: **Satin**

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

1. Install fire-rated doors according to NFPA 80.

B. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

a. Comply with NFPA 80 for fire-rated doors.

C. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 081416

# SECTION 084113 - ALUMINUM-FRAMED STOREFRONTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Exterior and interior storefront framing.
2. Storefront framing for punched openings.

### 1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.

1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples: For each exposed finish required.

D. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams.

E. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

### 1.4 INFORMATIONAL SUBMITTALS

A. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.

B. Product test reports.

C. Field quality-control reports.

D. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025.

C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

D. System Performance. Provide exterior entrance and storefront assemblies that have been designed and fabricated to comply with system performance characteristics listed below as demonstrated by testing systems according to test methods designated.

1. Wind Loading. Provide capacity to withstand loading specified by structural design, tested in accordance with ASTM E 330.

E. Provide transmission characteristics of fixed framing to comply with requirements indicated below.

1. Air infiltration shall be not more than 0.06 CMF per square foot of fixed area in accordance with ASTM E 283.
2. No uncontrolled water penetration shall occur at pressure differential of 6.24 psf in accordance with ASTM E 331 (excluding operable door edges).
3. Condensation resistance shall be not less than 51 CRF in accordance with AAMA 1502.7.
4. The specified thermal transmittance U-value shall comply with the currently enforced International Energy Conservation Code requirements.

F. Provide transmission characteristics of entrances (doors with jamb and head frames) to comply with requirements indicated below.

1. Air infiltration per linear foot of perimeter crack shall be not more than 0.50 CFM for single doors and 1.0 CFM for pairs of doors at pressure differential of 1.567 psf in accordance with ASTM E 283.
2. Condensation resistance shall be not less than 48 CRF in accordance with

AAMA 1502.7.

3. The specified thermal transmittance U-value shall comply with the currently enforced International Energy Conservation Code requirements.

G. Installer Qualifications: The contractor to engage a firm who can provide evidence to indicate successful experience in the installation of work specified herein.

H. Welding Qualifications: Welding to comply with requirements of AWS D1.1 Structural Welding Code, for welding design, workmanship, techniques, inspection, and qualification of welding operators.

I. Provide separation between aluminum surfaces and sources of corrosion or electrolytic action, such as copper or untreated steel, by coating area of dissimilar metals with heavy-bodied bituminous paint.

J. For aluminum surfaces in contact with lime mortar or concrete, paint with alkali-resistant coating.

## 1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 2 years from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design aluminum-framed entrances and storefronts.

B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column

shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Where indicated on drawings provide "heavy duty/reinforced storefront". Coordinate these units with Delegated design requirements.
3. Failure also includes the following:

    a. Thermal stresses transferring to building structure.
    b. Glass breakage.
    c. Noise or vibration created by wind and thermal and structural movements.
    d. Loosening or weakening of fasteners, attachments, and other components.
    e. Failure of operating units.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

D. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.

E. Structural: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area:

    a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.

G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.

H. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.35 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.30 as determined according to NFRC 200.
3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 35 as determined according to NFRC 500.

I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 MANUFACTURERS

A. Basis-of-Design Product (Exterior): Subject to compliance with requirements, provide **Oldcastle, Series 3000 Thermal MultiPlane** or a comparable product by one of the following:

1. YKK AP America Inc
2. EFCO Corporation
3. Tubelite Inc.
4. Approved equal prior to bid.

B. Basis-of-Design Product (Interior): Subject to compliance with requirements, provide **Oldcastle, Series 3000 Thermal MultiPlane** Framing System or a comparable product by one of the following:

1. YKK AP America Inc
2. EFCO Corporation
3. Tubelite Inc.
4. Approved equal prior to bid.

2.3 FRAMING

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction Exterior: Thermally broken.
2. Construction Interior: Nonthermal.
3. Glazing System: Retained mechanically with gaskets on four sides.
4. Glazing Plane( Exterior): Front Set.
5. Glazing Plane( Interior): Center Set.

6. Finish: High-performance organic finish.
7. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

    a. Sheet and Plate: ASTM B 209.
    b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
    c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
    d. Structural Profiles: ASTM B 308/B 308M.

2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

    a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
    b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
    c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

## 2.4 GLAZING

A. Glazing: Comply with Section 08 80 00 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

## 2.5 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.

5. Provisions for field replacement of glazing from interior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.6 ALUMINUM FINISHES

A. AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

Finish: **Refer to Exterior Material Keynote Schedule on Drawing A520 for color selection.**

2.7 FURTHER REQUIREMENTS

A. SOURCE QUALITY CONTROL
A single manufacturer or source shall provide materials of each type to ensure matching of quality, color, pattern and texture. Source or brands shall not be changed during the course of construction.

B. MATERIALS

1. The basis of design of aluminum storefront system doors and frames shall be Standard Flush Glaze System as manufactured by Oldcastle. Frames and door stiles shall be tubular extrusions with 1/8 inch minimum wall thickness.
2. Other approved manufacturers:
   a. YKK
   b. Vista Wall Series 3000
3. Swinging doors shall be wide stile (6") doors.
4. Glazing stops shall be square type.
5. All exposed surfaces shall be free of scratches and other serious blemishes and shall receive Kynar 500 or be anodized.
6. Extrusions shall be 6063-T5 alloy and temper (ASTM B 221 alloy G.S. 10AT5). Fasteners, where exposed, shall be aluminum, stainless, steel, or plated steel in accordance with ASTM A 164. Perimeter anchors shall be aluminum or steel, providing the steel is property isolated from the aluminum. Glazing gaskets shall be elastomeric extrusions.
   a. The framing system shall provide for flush glazing on all sides

with no projecting stops. Vertical and horizontal framing members shall have a nominal face dimension of 2". Overall depth shall be 4 ½". Entrance framing members shall be compatible with glass framing in appearance. All single acting entrance frames shall include the Sealair positive barrier weathering.

C. FABRICATION

1. Provide the following requirements for shop assembly: Perform fitting and assembly of the work in the shop to the greatest extent possible. Work that cannot be permanently shop-assembled shall be completely assembled, marked, and disassembled before shipment, to assure assembly in the field. Require the following:
   a. Preglazing: Preglaze door and frame units to greatest extent possible, in coordination with installation and hardware requirements.
   b. Surface Mounted Hardware: Do not drill and tap for surface mounted hardware items until time of installation.
   c. Welding: Comply with AWS recommendations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 07 92 00 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 08 80 00 "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.

1. Water-Spray Test(exterior only): Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

a. Perform a minimum of two tests in areas as directed by Architect.

C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 084113

# SECTION 084333 – FOLDING GLASS STOREFRONTS

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes furnishing and installing a floor track supported, sliding-folding, thermally broken, aluminum-framed glass panel system that includes:

1. Aluminum frame
2. Threshold
3. Panels
4. Sliding-folding and locking hardware
5. Weather stripping
6. Glass and glazing
7. Insect screen (optional)
8. Accessories as required for a complete working installation.

B. Related Documents and Sections: Contractor to examine Contract Documents for requirements that directly affect or are affected by Work of this Section. A list of those Documents and Sections include, but is not limited to, the following:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 General Requirements, Specification Sections, apply to this Section.
2. Section 06 1053, Miscellaneous Rough Carpentry
3. Section 07 2726, Fluid Applied Membrane Air Barrier, Vapor Permeable
4. Section 07 6200, Sheet Metal Flashing and Trim
5. Section 07 9200, Joint Sealants

### 1.02 REFERENCES

A. Reference Standards in accordance with Division 01 and current editions from the following:

1. AAMA. American Architectural Manufacturers Association; www.aamanet.org
    a. AAMA 502, Voluntary Specification for Field Testing of Newly Installed Fenestration Products
    b. AAMA 520, Voluntary Specification for Rating the Severe Wind-Driven Rain Resistance of Windows, Doors and Unit Skylights
    c. AAMA 611, Voluntary Specification for Anodized Architectural Aluminum
    d. AAMA 920, Operation / Cycling Performance
    e. AAMA 1304, Voluntary Specification for Forced Entry Resistance of Side-Hinged Door Systems
    f. AAMA 2604, Voluntary Specifications, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and

Panels

g. AAMA 2605, Voluntary Specifications, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels

h. AAMA/WDMA/CSA 101/I.S.2/A440, NAFS, North American Fenestration Standard - Specification for Windows, Doors and Skylights

2. ANSI. American National Standards Institute; www.ansi.org
   a. ANSI Z97.1, Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings
3. ASTM. ASTM International; www.astm.org
   a. ASTM C1036, Standard Specification for Flat Glass
   b. ASTM C1048, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
   c. ASTM E283, Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
   d. ASTM E330, Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
   e. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
   f. ASTM E413, Classification for Rating Sound Insulation
   g. ASTM E547, Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
   h. ASTM E1332, Standard Classification for Rating Outdoor-Indoor Sound Attenuation
   i. ASTM E2268, Standard Test Method for Water Penetration of Exterior Windows, Skylights, and Doors by Rapid Pulsed Air Pressure Difference
   j. ASTM F842, Standard Test Methods for Measuring the Forced Entry Resistance of Sliding Door Assemblies
4. CPSC. Consumer Product Safety Commission; www.cpsc.gov
   a. CPSC 16CFR-1201, Safety Standard for Architectural Glazing Materials
5. CSA Group (Canadian Standards Association); www.csagroup.org/global/en/home
   a. CSA A440S1 - The Canadian supplement to North American (NAFS) standards
6. DIN. "Deutsches Institut für Normung" (German institute for standardization); www.en-standard.eu/din-standards
   a. DIN 52210-3, Testing of acoustics in buildings - Airborne and impact sound insulation - Laboratory measurements of sound insulation of building elements and field measurements between rooms
   b. DIN 52210-4, Tests in Building Acoustics - Airborne and Impact Sound
   c. DIN EN 1191, Windows and doors - Resistance to repeated opening and closing - Test method; German version EN 1191:2000
   d. DIN EN ISO 12400, Windows and pedestrian doors - Mechanical durability - Requirements and classification
7. Energy Star, U.S. Environmental Protection Agency (EPA) Program;

www.energystar.gov

8. FL. Florida Building Commission - Product Approval; https://floridabuilding.org/pr/pr_app_srch.aspx
9. NFRC. National Fenestration Rating Council; www.nfrc.org
    a. NFRC 100, Procedure for Determining Fenestration Product U-factors
    b. NFRC 200, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence
    c. NFRC 400, Procedure for Determining Fenestration Product Air Leakage
    d. NFRC 500, Procedure for Determining Fenestration Product Condensation Resistance Rating Values

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate Folding Glass Storefront system and framing R.O.

B. Pre-installation Meetings: See Section 01 30 00.

1.04 SUBMITTALS

A. For Contractor submittal procedures see Section 01 30 00.

B. Product Data: Submit manufacturer's printed product literature for each Folding Glass Storefront system to be incorporated into the Work. Show performance test results and details of construction relative to materials, dimensions of individual components, profiles and colors.

C. Product Drawings: Indicate Folding Glass Storefront system component sizes, dimensions and framing R.O., configuration, swing panels, direction of swing, stacking layout, typical head jamb, side jambs and sill details, type of glazing material, handle height and field measurements.

D. Installation, Operation and Maintenance Data: Submit Owner's Manual from manufacturer. Identify with project name, location and completion date, and type and size of unit installed.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer capable of providing complete, precision built, engineered, pre-fitted units with a minimum twenty-five (25) years' experience in the sale of folding-sliding door systems for large openings in the North American market.

B. Installer Qualifications: Installer experienced in the installation of manufacturer's products or other similar products for large openings. Installer to provide reference list of at least three (3) projects of similar scale and complexity successfully completed in the last three (3) years.

1. Installer to be trained and certified by manufacturer.

C. Single Source Responsibility: Furnish Folding Glass Storefront system materials from one manufacturer for entire Project.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's instructions and recommendations, Section 01 60 00 requirements, and as follows:

1. Deliver materials to job site in sealed, unopened cartons or crates.
    a. Upon receipt, inspect the shipment to ensure it is complete, in good condition and meets project requirements.

2. Store material under cover in a clean and dry location, protecting units against weather and defacement or damage from construction activities, especially to the edges of panels.

1.07 FIELD CONDITIONS

A. Field Measurements: Contractor to field verify dimensions of rough openings (R.O.) [ And threshold depressions to receive sill. ] Mark field measurements on product drawing submittal.

1.08 WARRANTY

A. Manufacturer Warranty: Provide Folding Glass Storefront system manufacturer's standard limited warranty as per manufacturer's published warranty document in force at time of purchase, subject to change, against defects in materials and workmanship.

1. Warranty Period beginning with the earliest of 120 days from Date of Delivery or Date of Substantial Completion:
   a. Rollers and Glass Seal Failure: Ten (10) years
   b. All Other Components Except Screens: Ten (10) years
      1). Exception: Five (5) years if NOT installed by manufacturer's certified trained installer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Product by Manufacturer: NanaWall NW Acoustical 645 by NANA WALL SYSTEMS, INC. (www.nanawall.com)

B. Design Criteria:

1. As indicated by the Drawings.

C. Approved equal prior to bid.

2.02 FABRICATION

A. Folding Glass Wall: Extruded aluminum frame and panel profiles, corner connectors and hinges, sliding and folding hardware, locking hardware and handles, glass and glazing and weather stripping.

1. Each unit factory pre-assembled and shipped with complete system components and installation instructions.
2. Exposed work to be carefully matched to produce continuity of line and design with all joints.
3. No raw edges visible at joints.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions per Section 01 70 00 and as follows:

1. Carefully examine rough openings with Installer present, for compliance with requirements affecting Work performance.
   a. Examine surfaces of openings and verify dimensions; verify rough openings are

level, plumb, and square with no unevenness, bowing, or bumps on the floor; and other conditions as required by the manufacturer for readiness to receive Work.

b. Verify structural integrity of the header for deflection with live and dead loads limited to the lesser of L/720 of the span or 1/4 inch (6 mm). Provide structural support for lateral loads, and both wind load and eccentric load when the panels are stacked open.

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

3.02 INSTALLATION

A. General: Install Folding Glass Storefront system in accordance with the Drawings, approved submittals, manufacturer's recommendations and installation instructions, and as follows:

1. Properly flash, waterproof and seal around opening perimeter.
2. Securely attach anchorage devices to rigidly fit frame in place, level, straight, plumb and square. Install frame in proper elevation, plane and location, and in proper alignment with other work.
3. When lower track is designed to drain, provide connections to allow for drainage.
4. Install panels, handles, lockset, screens and other accessories in accordance with manufacturer's recommendations and instructions.

3.03 FIELD QUALITY CONTROL

A. Field Tests and Inspections per Section 01 40 00 of the following:

1. Verify the Folding Glass Storefront system operates and functions properly. Adjust hardware for proper operation.

B. Non-Conforming Work: Repair or replace non-conforming work as directed by the Architect; see General and Supplementary Conditions, and Division 01, General Requirements.

3.04 CLEANING AND PROTECTION

A. Keep units closed and protect Folding Glass Storefront installation against damage from construction activities.

B. Remove protective coatings and use manufacturer recommended methods to clean exposed surfaces.

END OF SECTION 083323

# SECTION 085213 – ALUMINUM-CLAD WOOD CIRCLE WINDOWS

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Aluminum-clad wood circle windows.

### 1.2 RELATED SECTIONS

A. Section 07270 (07 27 00) - Air Barriers: Water-resistant barrier.

B. Section 07920 (07 92 00) - Joint Sealants: Sealants and caulking.

### 1.3 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
1. AAMA 502 - Voluntary Specification for Field Testing of Windows and Sliding Doors.
2. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
3. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. American Society for Testing and Materials (ASTM):
1. ASTM B 117 - Operating Salt Spray (Fog) Apparatus.
2. ASTM C 1036 - Flat Glass.
3. ASTM C 1048 - Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass.
4. ASTM D 1149 - Rubber Deterioration – Surface Ozone Cracking in a Chamber.
5. ASTM D 2803 - Filiform Corrosion Resistance of Organic Coatings on Metal.
6. ASTM D 4060 - Abrasion Resistance of Organic Coatings by the Taber Abraser.
7. ASTM E 283 - Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Difference Across the Specimen.
8. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
9. ASTM E 547 - Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Differential.
11. ASTM E 1105 – Standard Test Method for Field Determination of Water Penetration of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
12. ASTM G 85 - Modified Salt Spray (Fog) Testing.

C. Window and Door Manufacturers Association (WDMA):
1. AAMA/WDMA/CSA 101/I.S.2/A440 – North American Fenestration Standard/Specification for windows, doors and skylights
2. WDMA I.S.4 - Industry Specification for Preservative Treatment for Millwork.

1.4 PERFORMANCE REQUIREMENTS

A. Windows shall be Hallmark certified to a rating of FW-[CW] [AW]-PG[____ ] specifications in accordance with ANSI/AAMA/WDMA 101/I.S.2/A440-08 or ANSI/AAMA/WDMA 101/I.S.2/A440-11.

B. Window Unit Air Leakage, ASTM E 283, 6.24 psf (50 mph): 0.05 cfm per square foot of frame or less.

C. Window Unit Water Penetration: No water penetration through window unit when tested in accordance with ASTM E 547, under static pressure of 14.2 psf (75 mph) after 4 cycles of 5 minutes each, with water being applied at a rate of 5 gallons per hour per square foot.

1.5 SUBMITTALS

A. Comply with Division 1 requirements.

B. Product Data: Submit manufacturer's product data, including installation instructions.

C. Shop Drawings: Submit manufacturer's shop drawings, indicating dimensions, construction, component connections and locations, anchorage methods and locations, hardware locations, and installation details.

D. Samples: Submit full-size or partial full-size sample of window illustrating glazing system, quality of construction, and color of finish.

E. Warranty: Submit manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

A. Mockup:
1. Provide sample installation for field testing window performance requirements and to determine acceptability of window installation methods.
2. Approved mockup shall represent minimum quality required for the Work.

3. Approved mockup **shall remain in place** within the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site undamaged in manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.

B. Storage: Store materials in an upright position, off ground, under cover, and protected from weather, direct sunlight, and construction activities.

C. Handling: Protect materials and finish during handling and installation to prevent damage.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Pella Corporation, 102 Main Street, Pella, Iowa 50219. Toll Free (800) 54-PELLA. Phone (641) 621-1000. Website www.pella.com.

2.2 ALUMINUM-CLAD WOOD CIRCLE WINDOWS

A. Aluminum-Clad Wood Fixed-Frame Windows: Pella "Clad Frame" factory-assembled, aluminum-clad wood, fixed-frame windows.

B. Frame (Sill):
1. Select woods, water-repellent, preservative-treated with EnduraGuard® in accordance with WDMA I.S.-4. EnduraGuard includes water-repellency, three active fungicides and an insecticide applied to the frame.
2. Interior Exposed Surfaces: Clear Pine with no visible fastener holes.
3. Exterior Surfaces: Clad with aluminum.
4. Sill Assembly: Mitered at ends where joined to curved head member.
5. Overall Frame Depth: 5 inches (127 mm).

C. Frame (Curved Head Member):
1. Select woods, water-repellent, preservative-treated with EnduraGuard in accordance with WDMA I.S.-4. EnduraGuard includes water-repellency, three active fungicides and an insecticide applied to the frame.
2. Solid-wood-core blocks bonded with water-resistant glue to stabilized cellulose fiber.
3. Two sheets laminated with veneers at interior.
4. Interior Exposed Surfaces: Clear Pine with no visible fastener holes.
5. Exterior Surfaces: Clad with aluminum.
6. Curved Head Assembly: Mitered at ends where joined to sill, screwed and sealed.
7. Overall Frame Depth: 5 inches (127 mm).

2.3 GLAZING

A. Glazing:
1. Float Glass: ASTM C 1036, Quality 1.
   a. Tempered Glass: ASTM C 1048.

2. Type: Urethane-glazed, [11/16] [1]-inch, dual-seal, [annealed] [tempered] insulating glass [clear] [multi-layer Low-E coated with argon] [bronze air-filled multi-layer, Low-E coated] [gray air-filled multi-layer, Low-E coated] [green air-filled multi-layer, Low-E coated].

3. Type: Silicone-glazed 1" triple-pane, dual-seal, [annealed] [tempered] insulating glass, [clear] [multi-layer Low-E coated with [argon] [krypton]] [bronze air-filled multi-layer, Low-E coated] [gray air-filled multi-layer, Low-E coated] [green air-filled multi-layer, Low-E coated].

4. Integral Light Technology Glazing and Grilles:
   a. Insulating glass contains non-glare spacer between the panes of glass.

b. Grid: Adhered to glass on double pane and a metal spacer on triple pane.

c. Room Side Grilles: **2"** wide ogee profile that are solid **WD-1**
d. Exterior Grilles: Extruded aluminum **2" ogee profile**. Dimension to match room side grilles.
e. Bars shall be adhered to both sides of insulating glass with VHB acrylic adhesive tape and aligned with foam grid.
f. Finish: Finish color matches interior and exterior finish colors.

2.5 TOLERANCES

A. Windows shall accommodate the following opening tolerances:
1. Vertical Dimensions Between High and Low Points: Plus 1/4 inch, minus 0 inch.
2. Width Dimensions: Plus 1/4 inch, minus 0 inch.
3. Building Columns or Masonry Openings: Plus or minus 1/4 inch from plumb.

2.6 FINISH

A. Exterior Finish System: Pella EnduraClad.
1. Exterior aluminum surfaces shall be finished with the following multi-stage system:
a. Clean and etch aluminum surface of oxides.
b. Pre-treat with conversion coating.
c. Top coat with baked-on polyester enamel.
2. Color: **Custom Refer to Drawings.**
3. Performance Requirements: Exterior aluminum finishes shall meet or exceed all performance requirements of AAMA 2603 and the following performance requirements of AAMA 2605:
a. Dry Film Hardness: Eagle Turquoise Pencil, H minimum.
b. Film Adhesion: 1 mm crosshatch, dry, wet, boiling water.
c. Impact Resistance: 1/10-inch distortion, no film removal.
d. Chemical Resistance: 10 percent Muriatic acid, 15 minutes. Mortar pat test, 24 hours.
e. Detergent Resistance: 3 percent at 100 degrees F, 72 hours.
f. Corrosion Resistance: ASTM G85-A5, 2000 hours. Humidity, 3,000 hours. Salt spray exceeds 3,000 hours.

C. Interior Finish: **Factory-primed with 1 coat acrylic latex**

2.7 INSTALLATION ACCESSORIES

A. Flashing/Sealant Tape: Pella SmartFlash.
1. Aluminum-foil-backed butyl window and door flashing tape.
2. Maximum Total Thickness: 0.013 inch.
3. UV resistant.
4. Verify sealant compatibility with sealant manufacturer.

B. Interior Insulating-Foam Sealant: Low-expansion, low-pressure polyurethane insulating window and door foam sealant.

C. Exterior Perimeter Sealant: "Pella Window and Door Installation Sealant" or equivalent high quality, multi-purpose sealant as specified in the joints sealant section.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive windows. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install windows in accordance with manufacturer's instructions and approved shop drawings.

B. Install windows to be weather-tight.

C. Maintain alignment with adjacent work.

D. Secure assembly to framed openings, plumb and square, without distortion.

E. Integrate window system installation with exterior water-resistant barrier using flashing/sealant tape. Apply and integrate flashing/sealant tape with water-resistant barrier using watershed principles in accordance with window manufacturer's instructions.

F. Place interior seal around window perimeter to maintain continuity of building thermal and air barrier using backer rod and sealant.

G. Seal window to exterior wall cladding with sealant and related backing materials at perimeter of assembly.

3.4 CLEANING

A. Clean window frames and glass in accordance with Division 1 requirements.

B. Do not use harsh cleaning materials or methods that would damage finish.

C. Remove labels and visible markings.

3.5 PROTECTION

A. Protect installed windows to ensure that, except for normal weathering, windows will be without damage or deterioration at time of substantial completion.

END OF SECTION 085213

# SECTION 087100 - DOOR HARDWARE

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 "General Requirements" sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
6. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

### 1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute – ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
   a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
   b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
   a. Wiring Diagrams: For power, signal, and control wiring and including:
      1) Details of interface of electrified door hardware and building safety and security systems.
      2) Schematic diagram of systems that interface with electrified door hardware.
      3) Point-to-point wiring.
      4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
   a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:
   a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.

b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
c. Indicate complete designations of each item required for each opening, include:
    1) Door Index: door number, heading number, and Architect's hardware set number.
    2) Quantity, type, style, function, size, and finish of each hardware item.
    3) Name and manufacturer of each item.
    4) Fastenings and other pertinent information.
    5) Location of each hardware set cross-referenced to indications on Drawings.
    6) Explanation of all abbreviations, symbols, and codes contained in schedule.
    7) Mounting locations for hardware.
    8) Door and frame sizes and materials.
    9) Degree of door swing and handing.
    10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:
    a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
    b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
    c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
    d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
    e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
    f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
    a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
    b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:

a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
b. Catalog pages for each product.
c. Final approved hardware schedule edited to reflect conditions as installed.
d. Final keying schedule
e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
   a. Fire door assemblies, in compliance with NFPA 80.
   b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
   a. For door hardware: DHI certified AHC or DHC.
   b. Can provide installation and technical data to Architect and other related subcontractors.
   c. Can inspect and verify components are in working order upon completion of installation.
   d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.

4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
   a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.

b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

2. Smoke and Draft Control Door Assemblies:
   a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
   b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware
   a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

4. Accessibility Requirements:
   a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
   a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      2) Preliminary key system schematic diagram.
      3) Requirements for key control system.
      4) Requirements for access control.
      5) Address for delivery of keys.

2. Pre-installation Conference
   a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   b. Inspect and discuss preparatory work performed by other trades.
   c. Inspect and discuss electrical roughing-in for electrified door hardware.
   d. Review sequence of operation for each type of electrified door hardware.
   e. Review required testing, inspecting, and certifying procedures.
   f. Review questions or concerns related to proper installation and adjustment of door hardware.

3. Electrified Hardware Coordination Conference:
   a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.

C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

## 1.06 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

## 1.07 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.

1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
    a. Mechanical Warranty
        1) Locks: 10 years
        2) Exit Devices: 10 years

3) Closers: 25 years

b. Electrical Warranty
   1) Exit Devices: 3 years
   2) Automatic Operators: 2 years

1.08 MAINTENANCE

A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."

   1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.

B. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.

C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.

D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fabrication

   1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
   2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.

3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

C. Cable and Connectors:

1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

## 2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Ives 5BB series
2. Acceptable Manufacturers and Products: McKinney, PBB

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch thick doors, up to and including 36 inches wide:
   a. Exterior: Heavy weight, stainless steel, 4-1/2 inches high
   b. Interior: Standard weight, steel, 4-1/2 inches high

4. 1-3/4 inch thick doors over 36 inches wide:
   a. Exterior: Heavy weight, stainless steel, 5 inches high
   b. Interior: Heavy weight, steel, 5 inches high

5. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
6. Provide three hinges per door leaf for doors 90 inches or less in height, and one additional hinge for each 30 inches of additional door height.
7. Hinge Pins: Except as otherwise indicated, provide steel hinge pins as follows:
   a. Out-Swinging Lockable Doors: Non-removable pins
   b. In-Swinging and/or Non-lockable Doors: Non-rising pins

## 2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Select, ABH

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

## 2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product: Von Duprin EPT-10
2. Acceptable Manufacturers and Products: ABH PT1000

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

## 2.06 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage ND series
2. Acceptable Manufacturers and Products: Falcon T series, Sargent 11-T Line

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.

2. Indicators: Where specified, provide escutcheon with lock status indicator window on top of lockset rose:
   a. Escutcheon height (including rose) 6.05 inches high by 3.68 inches wide.
   b. Indicator window measuring a minimum 3.52-inch by .60 inch with 1.92 square-inches of front facing viewing area and 180-degree visibility with a total of .236 square-inches of total viewable area.
   c. Provide snap-in serviceable window to prevent tampering. Lock must function if indicator is compromised.
   d. Provide messages color-coded with full text and symbol, as scheduled, for easy visibility.
   e. Unlocked and Unoccupied message will display on white background, and Locked and Occupied message will display on red background.
3. Cylinders: Refer to "KEYING" article, herein.
4. Provide locks with standard 2-3/4 inches backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
5. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
6. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
8. Provide electrified options as scheduled in the hardware sets.
9. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
   a. Lever Design: Schlage Athens (ATH).

## 2.07 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Von Duprin 78/75A series
2. Acceptable Manufacturers and Products: Detex Advantix Series, Falcon 25/24 Series

B. Requirements

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware with manufacturer's approved strikes.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements. No plastic inserts are allowed in touchpads.
4. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect. Touchpad must extend a minimum of one half of door width.
5. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
6. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
7. Provide electrified options as scheduled.

8. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
9. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.08 KEYSWITCHES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage 650 series
2. Acceptable Manufacturers and Products: Security Door Control 700 series

B. Requirements:

1. Provide key switches capable of being configured to momentary or maintained action.
2. Provide key switches that accept a mortise cylinder. Cylinders: Refer to "KEYING" article, herein.

2.09 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage/Von Duprin PS900 Series
2. Acceptable Manufacturers and Products: Dynalock 5000 series

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
   a. 12/24 VDC Output, field selectable.
   b. Class 2 Rated power limited output.
   c. Universal 120-240 VAC input.
   d. Low voltage DC, regulated and filtered.
   e. Polarized connector for distribution boards.
   f. Fused primary input.
   g. AC input and DC output monitoring circuit w/LED indicators.
   h. Cover mounted AC Input indication.
   i. Tested and certified to meet UL294.
   j. NEMA 1 enclosure.
   k. Hinged cover w/lock down screws.
   l. High voltage protective cover.

2.10 CYLINDERS

A. Manufacturers:

1. Scheduled Manufacturer and Product: To Be Confirmed and Match Owner's Existing, No Substitution

B. Requirements:

1. Provide cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

2.11 KEYING

A. Scheduled System:

1. Existing non-factory registered system:
   a. Provide cylinders/cores keyed into Owner's existing keying system managed by Owner's locksmith, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Construction Keying:
   a. Temporary Construction Cylinder Keying.
      1) Provide construction cores that permit voiding construction keys without cylinder removal, furnished in accordance with the following requirements.
         a) Split Key or Lost Ball Construction Keying System.
         b) 3 construction control keys, and extractor tools or keys as required to void construction keying.
         c) 12 construction change (day) keys.
      2) Owner or Owner's Representative will void operation of temporary construction keys.
   b. Replaceable Construction Cores.
      1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
         a) 3 construction control keys
         b) 12 construction change (day) keys.
      2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2. Permanent Keying:
   a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
      1) Master Keying system as directed by the Owner.
   b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
   c. Provide keys with the following features:
      1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)

d. Identification:
   1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
   2) Identification stamping provisions must be approved by the Architect and Owner.
   3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE".
   4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
   5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
e. Quantity: Furnish in the following quantities to be confirmed with Owner.
   1) Permanent Control Keys: 3.
   2) Master Keys: 6.
   3) Change (Day) Keys: 3 per cylinder/core that is keyed differently
   4) Key Blanks: Quantity as determined in the keying meeting.

## 2.12 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer: Telkee
2. Acceptable Manufacturers: HPC, Lund

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
   a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
   b. Provide hinged-panel type cabinet for wall mounting.

## 2.13 HEAVY DUTY DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN 4050A series
2. Acceptable Manufacturers and Products: Falcon SC70A series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
3. Closer Body: 1-1/2-inch diameter with 11/16-inch diameter heat-treated pinion journal and full complement bearings.

4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and all weather requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide stick on templates, special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

## 2.14 MEDIUM DUTY DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN 1450 series
2. Acceptable Manufacturers and Products: Falcon SC80A series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory.
2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
3. Closer Body: 1-3/8-inch diameter with 5/8-inch diameter pinion journal diameter heat-treated pinion journal and full complement bearings.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Pressure Relief Valve (PRV) Technology: Not permitted.
7. Provide stick on and special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

## 2.15 ELECTRO-HYDRAULIC AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN 4600 series
2. Acceptable Manufacturers and Products: Horton 4000LE, Stanley M-Force

B. Requirements:

1. Provide low energy automatic operator units with hydraulic closer complying with ANSI/BHMA A156.19.

2. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
3. Provide units with conventional door closer opening and closing forces unless power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door
4. Provide units with on/off switch for manual operation, motor start up delay, vestibule interface delay, electric lock delay, and door hold open delay.
5. Provide drop plates, brackets, and adapters for arms as required for details.
6. Provide actuator switches and receivers for operation as specified.
7. Provide weather-resistant actuators at exterior applications.
8. Provide key switches with LED's, recommended and approved by manufacturer of automatic operator as required for function described in operation description of hardware group below. Cylinders: Refer to "KEYING" article, herein.
9. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
10. Provide units with vestibule inputs that allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

## 2.16 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Trimco, Elmes

B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

## 2.17 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Trimco, Don-Jo

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.

2. Sizes plates 2 inches less width of door on push side of: single doors, pairs of doors with a mullion, and either side of doors with edge guards. Size plates 1 inch less width of door on pull side of single or pairs of doors without edge guards and on push side of pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

## 2.18 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers: Glynn-Johnson
2. Acceptable Manufacturers: ABH

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

## 2.19 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Trimco, Burns

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.

## 2.20 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

B. Scheduled Manufacturer: Zero International

C. Acceptable Manufacturers: National Guard, Reese

D. Seals and Gasketing: Provide continuous gasketing on exterior openings, to the head and jambs, forming a continuous seal between the door and the frame. Provide smoke, light, or sound gasketing on interior doors where indicated.

1. Provide self-tapping fasteners for aluminum extruded gasketing being applied to hollow metal frames.
   a. Provide non-corrosive fasteners for all exterior applications.
   b. Provide security fasteners where indicated.

2. Provide neoprene, EPDM, silicone, or nylon brush inserts as specified in hardware sets. Provide non brush inserts of solid or sponge cell, as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

E. Smoke Labeled Gasketing: At all smoke labeled openings, provide smoke listed perimeter gasketing assemblies complying with NFPA 105 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.

F. Fire Listed Gasketing: Assemblies complying with NFPA 80 that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction for fire ratings indicated based on testing according to UL-10C.

1. Where frame-applied intumescent seals are required by the manufacturer, provide gaskets that comply with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies and UBC 7-2, Fire Tests of Door Assemblies.

G. Sound-Rated Gasketing: Provide acoustic gasketing to meet Sound Transmission Class (STC) rating required.

H. Meeting-Stile Gasketing: Provide meeting-stile gasketing that fastens to the meeting stiles forming a continuous seal when doors are closed.

I. Door Sweeps or Shoes: Apply to the bottom of the door to close the gap between the door bottom and finished floor or saddle threshold.

1. Provide solid neoprene, EPDM, silicone, or nylon brush type of seal as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

J. Automatic Door Bottoms:

1. Provide closed cell sponge, bulb neoprene. or EPDM type of seal as specified in hardware sets.
2. Door bottom to be mortised, semi mortised, or surface mount as with a minimum thickness as specified in hardware sets.

K. Rain Drips:

1. Provide overhead rain drips for out-swinging hollow metal doors that are not covered against 45 degree blowing rain. Aluminum extrusion to be a minimum of .088 inches thick and extend 2.50 inches from the face of the frame, in anodized finish to match door.
2. Door sweeps or shoes with integral rain drip must meet ADA requirements

L. Thresholds: Provide threshold units not less than 4 inches wide, formed to accommodate change in floor elevation where indicated, and fabricated to accommodate door hardware and fit door frames.

1. Threshold extrusion to be a minimum thickness as specified in hardware sets.

## 2.21 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer: Schlage
2. Acceptable Manufacturers: GE-Interlogix

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches between switch and magnetic locking device.

2.22 LOCK GUARDS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Trimco, Burns

B. Provide 1/8 inch thick stainless steel lock guards of type required to function with specified lock.

2.23 COAT HOOKS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Trimco, Burns

B. Provide coat hooks as specified.

2.24 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: BHMA 689 Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

## 3.01 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

## 3.02 INSTALLATION

A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
4. Installation Guide for Doors and Hardware: DHI TDH-007-20

B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.

C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

I. Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.
3. Furnish permanent cores to Owner for installation.

J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Connections to panel interface modules, controllers, and gateways.
6. Testing and labeling wires with Architect's opening number.

K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

L. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.

M. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

N. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

O. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

P. Thresholds:

1. Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
2. Aluminum thresholds to be cut-in, and scribed around mullions, frame members, and stops. Do not butt to thresholds. Provide a continuous surface across full width of opening from jamb to jamb.
3. Where aluminum panic-type (rabbeted) thresholds with neoprene inserts are specified, undercut doors as required to properly mate with seal in threshold.

Q. Perimeter Gasketing:

1. Apply to head and jamb, forming seal between door and frame.
2. Install gasketing in a manner eliminating need to cut any seal to install surface mounted hardware. Install compatible mounting bracket for surface mounted hardware unless minimum 1/4 inch thick solid aluminum seals are provided for mounting of surface applied hardware.

R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

## 3.03 ADJUSTING

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

   1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

## 3.04 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

## 3.05 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

HW SET: 01
DOOR #(S):
102 103 113
EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PERM CORE/K-I-L CYL | AS REQUIRED | 626 | |
| 1 | EA | ENTRANCE/OFFICE LOCK | ND50 ATH | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 1450 REG | 689 | LCN |
| 1 | EA | FLOOR STOP | FS410 | 626 | IVE |
| 1 | EA | SEAL SET | BY FRAME MFR | | |

HW SET: 02
DOOR #(S):
104
EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PERM CORE/K-I-L CYL | AS REQUIRED | 626 | |
| 1 | EA | STOREROOM LOCK | ND80 ATH | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 1450 REG | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 626 | IVE |

HW SET: 03
DOOR #(S):
105
EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 1 | EA | PERM CORE/K-I-L CYL | AS REQUIRED | 626 | |
| 1 | EA | STOREROOM LOCK | ND80 ATH | 626 | SCH |
| 1 | EA | LOCK GUARD | LG13 | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4050A SHCUSH | 689 | LCN |
| 1 | EA | GASKETING | 188SBK PSA | BK | ZER |
| 1 | EA | DOOR SWEEP | 8192AA | AA | ZER |
| 1 | EA | THRESHOLD | 655A-V3-223 | A | ZER |
| 1 | EA | DOOR CONTACT | 679-05HM | BLK | SCE |

COORDINATE DOOR CONTACT WITH ACCESS CONTROL.

HW SET: 04
DOOR #(S):
106
EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PERM CORE/K-I-L CYL | AS REQUIRED | 626 | |
| 1 | EA | STOREROOM LOCK | ND80 ATH | 626 | SCH |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 626 | IVE |

HW SET: 05
DOOR #(S):
107
EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PERM CORE/K-I-L CYL | AS REQUIRED | 626 | |
| 1 | EA | ENTRANCE/OFFICE LOCK | ND50 ATH | 626 | SCH |
| 1 | EA | OH STOP | 100S | 630 | GLY |
| 1 | EA | SEAL SET | BY FRAME MFR | | |

HW SET: 06
DOOR #(S):
109 110
EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PRIVACY LOCK W/ OUTSIDE INDICATOR | ND40S ATH OS-OCC | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 1450 REG | 689 | LCN |
| 1 | EA | MOP PLATE | 8400 10" X 1" LDW B-CS | 630 | IVE |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 626 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | COAT AND HAT HOOK | 582 | 626 | IVE |

HW SET: 07
DOOR #(S):
111
EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 1 | EA | PANIC HARDWARE | 78-EO | 626 | VON |
| 1 | EA | SURFACE CLOSER | 4050A SCUSH | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | GASKETING | 188SBK PSA | BK | ZER |
| 1 | EA | DOOR SWEEP | 8192AA | AA | ZER |
| 1 | EA | THRESHOLD | 655A-223 | A | ZER |
| 1 | EA | DOOR CONTACT | 679-05HM | BLK | SCE |

COORDINATE DOOR CONTACT WITH ACCESS CONTROL.

HW SET: AL-01
DOOR #(S):
100
EACH TO HAVE:

| | | | | | |
|---|---|---|---|---|---|
| 1 | EA | CONT. HINGE | 112XY | 628 | IVE |
| 1 | EA | CONT. HINGE | 112XY EPT | 628 | IVE |
| 1 | | POWER TRANSFER | EPT10 CON | 689 | VON |
| 1 | EA | PANIC HARDWARE | 7547-EO | 626 | VON |
| 1 | EA | ELEC PANIC HARDWARE | RX-QEL-7547-NL-OP | 626 | VON |
| 1 | EA | RIM CYLINDER/CORE | AS REQUIRED | 626 | |
| 1 | EA | MORTISE CYL/CORE | AS REQUIRED | 626 | |
| 2 | EA | ARCH LADDER PULL | AP423N-24 | 630 | TRM |
| 1 | EA | SURFACE CLOSER | 4050A SCUSH | 689 | LCN |
| 1 | EA | SURF. AUTO OPERATOR | 4642 WMS | 689 | LCN |
| 1 | EA | ACTUATOR, TOUCH | 8310-818T | 630 | |
| 1 | EA | BOLLARD | BPS-IG X 4X4-3 | 628 | WIK |
| 2 | EA | FLOOR STOP | FS18S | BLK | IVE |
| 1 | EA | SEAL SET | BY FRAME MFR | | |
| 1 | EA | MEETING EDGE SEAL | DOOR MFR STD | | |
| 2 | EA | DOOR SWEEP | DOOR MFR STD | | |
| 1 | EA | THRESHOLD | 545A-223 | A | ZER |
| 1 | EA | KEY SWITCH | 653-1414 L2 | 630 | SCE |
| 2 | EA | DOOR CONTACT | 679-05HM | BLK | SCE |
| 1 | EA | POWER SUPPLY | PS902-4RL | | VON |

COORDINATE WITH ELECTRICAL.
COORDINATE DOOR CONATCT WITH ACCESS CONTROL.
OPERATION: WHEN KEY SWITCH IS TURNED TO 'ON' POSITION, ACTIVE LEAF LATCHBOLT RETRACTS AND OUTSIDE ACTUATOR IS ENERGIZED. DEPRESSION OF OUTSIDE ACTUATOR AUTOMATICALLY OPENS DOOR. INSIDE ACTUATOR ALWAYS ENERGIZED. DEPRESSION OF INSIDE ACTUATOR AUTOMATICALLY RETRACTS LATCHBOLT IF REQUIRED AND AUTOMATICALLY OPENS ACTIVE LEAF. FREE EGRESS AT ALL TIMES. FAIL SECURE.

HW SET: B-01
DOOR #(S):
114
ALL HARDWARE BY WALL MANUFACTURER. PROVIDE CYLINDER/CORE IF REQUIRED.

END OF SECTION

# SECTION 088000 - GLAZING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
   1. Windows.
   2. Doors.
   3. Storefront.
   4. Interior borrowed lites.

### 1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 by a qualified professional engineer, using the following design criteria:
   1. Design Wind Pressures: As indicated on Drawings.
   2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
   3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

B. General: Provide glazing systems that are produced, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading (where applicable), without failure including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; and other defects in construction.

### 1.3 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
   1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

### 1.4 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Preconstruction adhesion and compatibility test report.

1.6 QUALITY ASSURANCE

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
   1. GANA Publications: GANA's "Glazing Manual."
   2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

D. Fire-Resistive Glazing Products for Door Assemblies: Products identical to those tested per ASTM E 152, labeled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

E. **The Manufacturer is to provide the installer with specifications and installation instructions for each type of glazing sealant, gasket and associated miscellaneous material required. Manufacturer's published data, or letter of certification, or certified test laboratory report indicating that each material complies with the requirements and is intended generally for the specific application is also to be provided.**

F. **The Manufacturer is to provide the installer with Material Data Indicating that glazing materials will withstand the forces specified in the design documents which shall include basis for determining wind loading criteria and indicate concurrence with glazing channel dimensions.**

G. **Glass units shall be handled and stored in accordance with manufacturer's instructions.**

H. **Specify that all glass installations shall be watertight and airtight installation of each piece of glass is required. Each installation must withstand normal temperature changes, wind loading, impact loading (for operating sash and doors) without failure of any kind including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the work.**

I. **Specify that glazing channels shall provide for necessary minimum bite on the glass, minimum edge clearance and adequate sealant thicknesses, within allowable tolerances. The installer is responsible for correct glass size for each opening, within the tolerances and necessary dimensions established.**

J. **Specify that all glass shall be protected from edge at all times during handling, installation and operation of the building. Glass breakage during the warranty period will be considered a form of faulty material or workmanship (resulting from edge damage) unless known to result from vandalism or other causes not related to materials and workmanship.**

K. **All glass shall bear the manufacturer's label to identify type, thickness and quality.**

L. **Require that at a minimum all glass installations shall comply with published recommendations of glass product manufacturers and organizations below.**
   1. **FGMA Publications: "FGMA Glazing Manual."**
   2. **LSGA Publications: "LSGA Design Guide."**
   3. **SIGMA Publications: TM-3000 "Vertical Glazing Guidelines"**

J. **Specify that all glass shall be a minimum 1/4 inch minimum thickness.**

K. **Specify that all glass panels shall be field measured to fit in provided openings.**

L. **Specify that the sizes for glass shall be measured and determined from the installed frames, doors and sash.**

M. **Require that Workmanship shall be in accordance with the Standards of the Flat Glass Marketing Association Glazing Manual.**

N. **Glass material shall be specified according to the following performance criteria:**
   1. **Light Transmittance**
   2. **Reflectance**
   3. **U Value**
   4. **Shading Coefficient**
   5. **Solar Heat Gain**

1.7 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

**1.** Warranty Period: 10 years from date of Substantial Completion **provided in writing.**

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

**1.** Warranty Period: 10 years from date of Substantial Completion **provided in writing.**

C. **All units: Manufacturer's standard warranty that glass units supplied to Project will be free from defects in material and workmanship shall be provided.**

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

**1. PPG Industries (Basis of Design)**
2. Old Castle
3. ACG Flat Glass of North America
4. Architect Approved Equal prior to bid.

B. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

C. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

C. Silicone-Coated Spandrel Glass: ASTM C 1048, Condition C, Type I, Quality-Q3, and complying with other requirements specified.
   1. Glass: Clear float.
   2. Silicone Coating Color: **As selected by Architect from manufacturer's full range.**

2.3 INSULATING GLASS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   **1. PPG Industries (Basis of Design)**
   2. Old Castle
   3. ACG Flat Glass of North America
   4. Architect Approved Equal prior to bid

**B. For insulated Glass Units, the following is required:**
   **1. All exterior glass shall be insulated glazing, including spandrel glass, full and partial lite glass doors.**
   **2. Insulating glass shall consist of two lites of glass with a hermetically and permanently sealed air space, and shall conform to Sealed Insulating Glass Manufacturer's Association (SIGMA) No. 65-7-2, "Sealed Insulating Glass Units."**
   **3. Exterior lite shall be 1/4 inch (6.0 mm) thick float glass and fully tempered where applicable.**
   **4. Interior glazing use clear glass, single lite and be fully tempered where applicable.**
   **5. Interior lite shall be 1/4 inch (6.0 mm) thick float glass and fully tempered where applicable.**
   **6. Air space shall be ½ inch (120 mm) Type B system.**
   **7. Insulated glass must be approved by the County for the intended use and shall meet the minimum requirements of the International Energy Conservation Code, currently adopted edition.**

2.4 FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing according to NFPA 257 or UL 9, including the hose-stream test, and shall comply with NFPA 80.
   1. Fire-protection-rated glazing required to have a fire-protection rating of 20 minutes shall be exempt from the hose-stream test.

B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 deg F (250 deg C) temperature-rise limitation; and the fire-resistance rating in minutes.

C. Fire-Protection-Rated Tempered Glass: 6-mm thickness, fire-protection-rated tempered glass; and complying with 16 CFR 1201, Category II.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. AGC Glass Company North America, Inc.
      b. SAFTI FIRST Fire Rated Glazing Solutions.
      c. Technical Glass Products.
      d. Vetrotech Saint-Gobain.
      e. Approved equal prior to bid.

D. Film-Faced Ceramic Glazing: Clear, ceramic flat glass; 5-mm thickness; faced on one surface with a clear glazing film; and complying with 16 CFR 1201, Category II.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

      a. AGC Glass Company North America, Inc.
      b. SAFTI FIRST Fire Rated Glazing Solutions.
      c. Schott North America, Inc.
      d. Technical Glass Products.
      e. Vetrotech Saint-Gobain.
      f. Approved equal prior to bid.

## 2.5 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
   1. Neoprene complying with ASTM C 864.
   2. EPDM complying with ASTM C 864.
   3. Silicone complying with ASTM C 1115.
   4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

## 2.6 GLAZING SEALANTS

A. General:
   1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
4. **Glazing Compound: For metal frames, provide conformance with section "Glazing Materials" of the FGMA Glazing Manual. Compound used for glazing aluminum shall be pigmented with aluminum powder to match aluminum unit without staining or discoloring, shall be nonhardening and shall be a type not requiring painting.**
5. **When flexible vinyl gasket channels are used, provide conformance with ASTM D 2287.**
6. **Not Permitted: metal sash putty, non-skinning compounds, non-resilient type preformed sealers, and preformed impregnated type gaskets.**
7. **Provide supplemental accessories to provide a complete installation, including glazing points, clips, shims, angles, heads, setting blocks and spacer strips.**

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

## 2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

## 2.8 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

## **2.9 MONOLITHIC-GLASS TYPES (all interior locations)**

A. Glass Type: Clear fully tempered float glass.
1. Thickness: 1/4 inch (6.0 mm.)
2. Provide safety glazing labeling.

B. Glass Type: Clear float glass.
1. Thickness: 1/4 inch (6.0 mm.)
2. Provide safety glazing labeling.

**2.10 INSULATING-GLASS TYPES (All exterior windows)**

A. **Glass Type: Solarban 70XL (2) Clear + Clear Insulating Glass Unit**
**1. Overall Unit Thickness: 1 inch (25 mm).**
**2. Thickness of Each Glass Lite: 1/4 inch (6.0 mm.)**
**3. Outdoor Lite: clear float glass, tempered as required per code with Solarban 70XL on second surface.**
**4. Interspace Content: Air.**
**5. Indoor Lite: clear float glass, tempered as required per code.**
**6. VLT = 64%**
**7. Exterior Reflectance = 12%**
**8. Interior Reflectance = 13%**
**9. U-Value Imperial (Winter) Air = 0.28**
**10. SHGC = 0.27**
**11. LSG = 2.37**
**12. Provide safety glazing labeling.**
**13. Note a butt glazed corner is to be provided at all exterior corner conditions.**

2.11 TEMPERED GLASS

A. Tempered Glass shall follow ASTM C 1048, Type 1 (transparent, flat glass), Quality-03, provide kind FT (fully tempered) float glass in place of annealed float glass. Provide tempered glass in interior and exterior "hazardous" locations, which are defined to include, but not limited to (refer to latest code):

1. Any glazing in doors
2. Any glazing within 24" of a door whose bottom edge is less than 60" A.F.F.,
3. Any glazing which meets all of the four following characteristics:
   a. Greater than 9 sq. ft. in area,
   b. Bottom edge less than 18" A.F.F.
   c. Top edge greater than 36" A.F.F.
   d. Closer than 36" from an adjacent walking surface.

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

## 3.2 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

F. Apply cap bead of elastomeric sealant over exposed edge of tape.

## 3.3 GASKET GLAZING

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

F. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Dow Corning Corporation.
    b. GE Construction Sealants; Momentive Performance Materials Inc.
    c. Tremco Incorporated.

2. Sealants shall have a VOC content of 250 g/L or less.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

## 3.4 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION 088000

# SECTION 088400 – TRANSLUCENT RESIN PANEL SYSTEM

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes:
   1. Polycarbonate plastic glazing.
   2. Enhanced UV-resistant polycarbonate plastic glazing.
   3. Laminated polycarbonate plastic glazing.

### 1.2 REFERENCES

A. ANSI Z 97.1 - American National Standard for Glazing Materials Used in Buildings -- Safety Performance Specifications and Methods of Test.

B. ASTM D 256 - Standard Test Method for Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.

C. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.

D. ASTM D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

E. ASTM D 1929 - Standard Test Method for Ignition Properties of Plastics.

F. ASTM D 635 – Standard Test Method for Rate of Building and/or Extent and Time of Burning of Plastics in a Horizontal Position.

G. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials

H. CAN/ULC 102.2 – Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.

### 1.3 SUBMITTALS

A. General: Submit the following in accordance with conditions of contact and Division 1 specification section 01 33 00 "Submittal Procedures".

B. Product Data: Submit manufacturer's product data; including product description, fabrication information, and compliance with specified performance requirements.

C. Submit product test reports from a qualified independent 3rd party testing agency indication each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed

test reports will be acceptable if for current manufacturer and indicative of products used on this project.

1. Test reports required are:
    a. Rate of Burning (ASTM D 635)
    b. Self-Ignition Temperature (ASTM D 1929)
    c. Flame Spread and Smoke Developed (ASTM E 84)
    d. Impact Strength (ASTM D 3763)
    e. Safety Glazing and Impact Strength (ANSI Z97.1-2004)

D. Samples for Initial Selection:

1. Submit minimum 2-inch by 2-inch samples. Indicate full color.

E. Samples for Verification:

1. Submit minimum 4-inch by 4-inch sample for each type and color of solid plastic fabrication.

F. Mockups:

1. Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects.
2. Build mockup of [each type of] Plastic Fabrication.
3. Approved mockups may become part of the completed work if undistributed at time of Substantial Completion.

G. Maintenance Data: Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions. Include in Project closeout documents.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications

1. Materials and systems shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least five (5) consecutive years and which can show evidence of those materials being satisfactory used on at least six (6) projects of similar size, scope and location.
2. Manufacturer must have documented training and qualification program for fabrication and installation of plastic fabrications.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver Plastic Fabrications, systems and specified items in manufacturer's standard protective masking.

B. Store materials in a flat orientation in a dry place that is not exposed to exterior elements.

C. Handle materials to prevent damage to finished surfaces.

D. Before installing Plastic Fabrications, permit them to reach room temperature.

E. Do not deliver Plastic Fabrications, systems, components and accessories to Project site until areas are ready for installation.

1.6 WARRANTY

A. Manufacturer's Special Warranty on Plastic Fabrications: Manufacturer's standard form agreeing to repair or replace units that fail in material or workmanship within the specified warranty period.

B. Warranty Period: 5 years from ship date.

C. The warranty shall not deprive the owner of other rights or remedies the Owner may have under provisions of the Contract Documents, and is in addition to and runs concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

Part 2 – PRODUCTS

2.1 MANUFACTURER

A. Manufacturer: 3form, Inc., Salt Lake City, Utah, USA / telephone 801-649-2500

2.2 MATERIALS

A. Koda XT produced from polycarbonate sheet

1. Engineered polycarbonate resin
2. Sheet Size: Maximum 4'x10'
3. Thickness: Minimum ¼"
4. Basis of Design Product: The design of Plastic Fabrications is based on Koda XT as provided by 3form, Inc. Products from other manufacturers must be approved by the Architect and Designer prior to bidding in accordance with the Instructions to Bidders and Section 10 60 00 "Product Requirements".

B. Sheet Minimum Performance Attributes:

Rate of Burning (ASTM D 635). Material must attain CC1Rating for a nominal thickness of 1.5 mm (0.060 in.) and greater.

1. Self-Ignition Temperature (ASTM D 1929). Material must have a Self-Ignition Temperature greater than 650°F.
2. Flame Spread and Smoke developed testing (ASTM E 84). Material must be able to meet a level of Class B (Flame spread less than 75 and smoke less than 450) at thickness of ½".
3. Impact Strength. Minimum impact strength test as measured by ASTM D 3763 of 20 ft. lbs. (for durability, shipping, installation, and use).
4. Safety Glazing. Material must attain a Class A impact rating in accordance with ANSI Z97.1-2004.

C. Interlayer Materials:

1. C3 Color: Play with 50,000 options in the core color palette. Combine colors up to three layers deep to control the hue, intensity and translucency, creating an exciting range of exact color specifications.

2. HighRes: Translucent high resolution imagery.

2.3 FABRICATION

General: Fabricate Plastic Fabrications to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles and other characteristics are indicated on the drawings.

I. Comply with manufacturer's written recommendations for fabrication.

J. Machining: Acceptable means of machining are listed below. Ensure that material is not chipped or warped by machining operations.

1. Sawing: Select equipment and blades suitable for type of cut required.
2. Drilling: Drills specifically designed for use with plastic products.
3. Milling: Climb cut where possible.
4. Routing
5. Tapping

K. Forming: Form products to shapes indicated using the appropriate method listed below. Comply with manufacturer's written instructions.

1. Cold Bending
2. Hot Bending

L. Laminating: Laminate to substrates indicated using adhesives and techniques recommended by manufacturer.

2.4 ACCESSORIES

A. Gaskets shall be as per manufacturer's standards to meet performance criteria.

B. Fasteners shall be per manufacturer's standards to meet performance requirements.

2.5 MISCELLANEOUS MATTERIALS

A. General: Provide products of material, size, and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaner: Type recommended by manufacturer.

C. Fasteners: Use screws designed specifically for plastics.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of Plastic Fabrications will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for the installation of Plastic Fabrications.

B. Manufacturer's shop to fabricate items to the greatest degree possible.

C. Utilize all fasteners recommended by manufacturer for type of installation indicated. Material that is chipped, warped, hazed or discolored as a result of installation or fabrication methods will be rejected.

D. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

We recommend that installation is completed by a 3form Certified Installer. Contact 3form for more information or to get a quote.

3.3 CLEANING AND PROTECTION

M. Protect surfaces from damage until date of substantial completion. Repair work or replace damaged work, which cannot be repaired to Architect's satisfaction period.

END OF SECTION 088400

# SECTION 092900 - GYPSUM BOARD

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

C. Samples: For each texture finish indicated on same backing indicated for Work.

### 1.3 **QUALITY CONTROLS**

A. **Contractor to obtain each type of gypsum board, other panel products, and finishing materials from a single manufacturer.**

B. **All gypsum assemblies shall be applied using screws. Nails are not permitted.**

C. **All gypsum finishing shall be accomplished by vacuum sanding.**

D. **All gypsum board patching to be from stud to stud.**

E. **Interior gypsum assemblies at exterior walls shall be full height.**

F. **Access panels shall be provided in all assemblies for any equipment or item requiring maintenance or periodic replacement.**

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

**1. Fire-Resistance Ratings shall comply with GA File Numbers in GA-600 "Fire Resistance Design Manual" or design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.**

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

C. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C 1396/C 1396M.

1. Manufacturers: **Gypsum board manufactured outside the Continental United States is not permitted**. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Georgia-Pacific Building Products.
    b. United States Gypsum Corporation.
    c. Quiet Solutions, Inc.
    d. National Gypsum Corporation.
    e. Approved equal prior to bid.

2. Thickness: 5/8 inch minimum or as indicated on drawings.
3. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M. **Provide in all gypsum board locations, unless indicated otherwise.**

1. Thickness: **5/8 inch.**
2. Long Edges: Tapered.

C. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Thickness: **5/8 inch.**
2. Long Edges: Tapered.

D. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces. To occur at all restroom locations. Refer to Drawings for locations.

1. Thickness: **5/8 inch Durock Cement Board Next Gen.**
2. Core: As indicated.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

E. Gypsum Board at Sound Wall Partitions

1. QuietRock 527 by Quiet Solution, Inc./Serious Energy, Inc. www.quietrock.com

a. Edges: Tapered.
b. Thickness: 5/8".
c. Weight: 2.7 psf.

2.4 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Basis of Design: Georgia-Pacific Building Products, DensShield Tile Backer
b. United States Gypsum Corporation.
c. Quiet Solutions, Inc.
d. National Gypsum Corporation.
e. Approved equal prior to bid.

2. Core: As indicated on Drawings.

3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:
   a. **All control joints in wall or ceiling to be anodized aluminum drywall reveal molding unless noted otherwise.**
   b. Cornerbead.
   c. Bullnose bead.
   d. LC-Bead: J-shaped; exposed long flange receives joint compound.
   e. L-Bead: L-shaped; exposed long flange receives joint compound.
   f. U-Bead: J-shaped; exposed short flange does not receive joint compound.
   g. Expansion (control) joint. **Provide at a minimum of every twenty feet (20'-0") in runs over twenty feet (20'-0") or as indicated on drawings.**
   h. Curved-Edge Cornerbead: With notched or flexible flanges.
3. Shapes:

   a. Cornerbead.
   b. Bullnose bead.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Fry Reglet Corporation.
    b. Gordon, Inc.
    c. Pittcon Industries.
    d. Approved equal prior to bid.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.

3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified. Finish as noted.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. **Skim entire wall Textured Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound. Use a trowel or large knife to spread joint compound in random, sweeping strokes. This mimics the irregular look of hand-applied plaster. Vary pressure and direction for a more natural, artisan look. Once dry, lightly sand high spots or overly sharp ridges. Finally, use a drywall primer to seal the compound and create a uniform surface for painting. Provide sample area to architect for approval prior to applying to all walls.**
6. **Drying-Type Joint Compounds for Gypsum Board shall be factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.**
    **a. Ready-Mixed Formulation: Factory-mixed product.**
        **1). Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.**
        **2). Topping compound formulated for fill (second) and finish (third) coats.**

**3). All-purpose compound formulated for both taping and topping compounds.**

D. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.

E. **Reveal Molding detail:**

1. **For areas where gypsum board abuts different material as well as control joints in gypsum board (locations are on drawings) separate with a Fry Reglet revel molding (www.fryreglet.com). Refer to Drawing I110 for requirements. Talk to architect about proper installation and reveal shapes. Material to be aluminum. Paint color of adjacent material.**

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
3. **Install for full height of wall assembly.**

E. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. **Acoustic sealant shall be provided at the top and bottom, and around all penetrations of assemblies classified as "sound" or "acoustic" rated assemblies.**
2. **Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant**

**recommended for sealing interior concealed joints to reduce transmission of airborne sound.**

3. **Sealant Products: Subject to compliance with these requirements, specify that the contractor shall provide one of the following:**
   a. **Acoustical Sealant for Exposed and Concealed Joints:**
      1). **PL Acoustical Sealant; ChemRex, Inc.; Contech Brands.**
      2). **AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.**
      3). **SHEETROCK Acoustical Sealant; United States Gypsum Co.**
   b. **Acoustical Sealant for Concealed Joints:**
      1). **BA-98; Pecora Corp.**
      2). **Tremco Acoustical Sealant; Tremco, Inc.**

F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

B. Comply with ASTM C 840.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

E. Prefill open joints and damaged surface areas.

F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: **Panels that are substrate for tile.**
3. Level 3: **Not used on this project.**
4. Level 4: **At all wall panel surfaces that will be exposed to view for back of house (non public rooms, storage rooms and equipment rooms.**

   a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

5. Level 5: **At all public wall panel surfaces.**

a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

H. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.2 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. Bullnose Bead: Use where indicated.
3. LC-Bead: Use at exposed panel edges.
4. L-Bead: Use where indicated.
5. U-Bead: Use where indicated.
6. Curved-Edge Cornerbead: Use at curved openings.
7. Custom shapes: where indicated.

D. Exterior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.

3.3 Aluminum Trim: Install in locations indicated on Drawings.

3.4 FIRE BARRIER / SMOKE BARRIER / SMOKE PARTITION IDENTIFICATION

A. Per intent of current edition of IBC Chapter 7: Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with stenciling. Such identification shall:

**1. Contractor shall permanently identify all fire resistant rated walls (and corresponding fire resistant rating) including fire barrier walls, smoke barrier walls, fire partitions, fire walls, and shaft enclosures either by installing signs or by stenciling in concealed spaces the following: (( ) HOUR FIRE AND SMOKE BARRIER, PROTECT ALL OPENINGS), Identification shall be spaced not more than twelve (12) feet on center with a minimum letter size of two (2) inches in height on a contrasting background (SBC section 7035 of the 2003 Georgia State Amendments (Title 25 State Fire Marshal's Rules and Regulations Chapter 120.3.3).**

3.5 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

SECTION 093030 –TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Tile and trim.

2. Thresholds.

3. Waterproof membrane.

4. Crack isolation membrane.

5. Metal edge strips.

1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. Module Size: Actual tile size plus joint width indicated.

C. Face Size: Actual tile size, excluding spacer lugs.

D. Wet Area: Tile surfaces that are either soaked, saturated, or regularly and frequently subjected to moisture or liquids (including water), such as gang showers, tub enclosures, showers, laundries, saunas, steam rooms, swimming pools, hot tubs, and exterior areas.

1.4 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum 0.60.

2. Step Treads: Minimum 0.60.

3. Ramp Surfaces: Minimum 0.80.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

C. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

D. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

1. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square, but not fewer than 4 tiles. Use grout of type and in color or colors approved for completed Work.

2. Grout: Submit manufacturer's full range of standard and designated color samples.

E. Product Certificates: For each type of product, signed by product manufacturer.

F. Material Test Reports: For each tile-setting and -grouting product.

G. Qualification Data: For qualified Installer.

1.6 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile of each type and color or finish from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:

1. Thresholds.

2. Waterproof membrane.

3. Crack isolation membrane.

4. Joint sealants.

5. Metal edge strips.

D. Pre-installation Conference: Conduct pre-installation conference at the site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.9 EXTRA MATERIALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.

C. Low-Emitting Materials: Tile flooring systems shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory

and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.2 PRODUCTS, MANUFACTURER

A. Acceptable Manufacturer: **Trinity Tiles.**

1. Substitutions: In accordance with Division 1 Section "Substitution Procedures."

2.3 PRODUCTS, TILE

A. Tile Type: Thru Color Porcelain, Floor and/or Wall Tile:

1. Series: **Refer to drawings.**
   a. Composition: Thru Color Porcelain.
   b. Module Size:
      **1) Refer to drawings**
   c. Trim Tile:
      **1) Refer to drawings**
   d. Color: **Refer to drawings.**
   e. Water Absorption: Less than 0.50 percent per ASTM C373.
   f. Coefficient of Friction:
      1) DCOF Wet Area: Minimum 0.42 per DCOF AcuTest℠
   g. Frost Resistance: Resistant per ASTM C1026.

2.4 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

**B. Refer to sheet I110 for required transition types.**

2.5 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Chlorinated Polyethylene Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030-inch nominal thickness.

1. Products: Subject to compliance with requirements, provide the following:
   a. Noble Company (The); Nobleseal TS.

C. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch nominal thickness:

1. Products: Subject to compliance with requirements, provide the following:
   a. Schluter Systems L.P.; KERDI.

D. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement:

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Laticrete International; 9235 Waterproofing and Anti-Fracture Membrane.

2.6 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Chlorinated Polyethylene Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030-inch nominal thickness.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Noble Company (The); Nobleseal CIS.

C. Corrugated Polyethylene: Corrugated polyethylene with dovetail-shaped corrugations and with anchoring webbing on the underside; 3/16-inch nominal thickness.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Schluter Systems L.P; Ditra.

D. Crack Isolation Membrane and Tile-Setting Adhesive: One-part, fluid-applied product intended for use as both a crack isolation membrane and tile-setting adhesive in a two-step process.

2.7 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

1. Cleavage Membrane: Asphalt felt, ASTM D 226, Type I (No. 15); or polyethylene sheeting, ASTM D 4397, 4.0 mils (0.1mm) thick.

2. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches by 0.062-inch diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.

3. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate

mortar bed.

B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Bonsal American; an Oldcastle company.
   b. Custom Building Products.
   c. Laticrete International, Inc.
   d. MAPEI Corporation.

2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.

3. Provide prepackaged, dry-mortar mix combined with [acrylic resin] [or] [styrene-butadiene-rubber] liquid-latex additive at Project site.

4. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

C. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3.

2.8 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.

B. Standard Cement Grout: ANSI A118.6.

C. Polymer-Modified Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Bostik, Inc.
   b. Custom Building Products.
   c. Laticrete International, Inc.
   d. MAPEI Corporation.
   e. Tex-Rite.

2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix. Basis of Design products include the following:

   a. Laticrete 1600 Unsanded Grout with Laticrete 1776 Grout Enhancer.

   b. Laticrete 1500 Sanded Grout with Laticrete 1776 Grout Enhancer.

   c. Laticrete PermaColor Grout.

D. Water-Cleanable Epoxy Grout: ANSI A118.3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Bostik, Inc.
   b. Custom Building Products.
   c. Laticrete International, Inc.
   d. MAPEI Corporation.
   e. Tex-Rite.

2. Basis of Design:
   a. **GRT-1/2/3**: (Wall / Floor Tile - High Performance Stain Resistant) Laticrete SpectraLOCK PRO (Part AB Liquid) with Laticrete SpectraLOCK Powder (Part C)
   b. **GRT-1/2/3**: (Wall / Floor Tile – Industrial Grade) Laticrete 2000 Industrial Grout, if used on vertical joints ½" or greater LATAPOXY Part D Non-Sag Additive
   c. **See finish legend for tile and grout types**.

2.9 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section "Joint Sealants."

   1. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

B. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.

2.10 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

**B. Metal Edge Strips: Refer to interior transition details as indicated on sheet I110.**

   **1. Install ADA compliant thresholds at all exterior doors as appropriate for the condition.**

C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

D. Grout Sealer: Manufacturer's standard [silicone] product for sealing grout joints and that does not change color or appearance of grout.

   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Bonsal American; an Oldcastle company; Grout Sealer.
      b. Custom Building Products; Grout and Tile Sealer.
      c. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.

2.11 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

2. Verify that concrete substrates for tile floors installed with thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
   a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
   b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.

4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

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

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory

blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 TILE INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
    a. Exterior tile floors.
    b. Tile floors in wet areas.
    c. Tile swimming pool decks.
    d. Tile floors in laundries.
    e. Tile floors composed of tiles 8 by 8 inches or larger.
    f. Tile floors composed of rib-backed tiles.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in pattern as indicated on Drawings. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile, or as otherwise indicted on Drawings. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.

2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.

3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

F. Joint Widths:

1. Ceramic Mosaic Tile: 1/16 inch.

2. Paver Tile: [1/4 inch [3/8 inch.

3. Glazed Wall Tile: 1/16 inch.

4. Decorative Thin Wall Tile: 1/16 inch.

G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

I. Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

J. Metal Edge Strips: Install in locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

K. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.

B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 CRACK ISOLATION MEMBRANE INSTALLATION

A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.

B. Do not install tile or setting materials over crack isolation membrane until membrane has cured.

3.6 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter. Remove latex-portland cement grout residue from tile

as soon as possible.

1. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

2. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

## 3.7 TILE INSTALLATION SCHEDULE

A. Exterior Floor Tile Installations:

1. Tile Installation F102: thin set mortar [over waterproofing membrane] on concrete

B. Exterior Wall Installation, masonry or Concrete:

1. Tile Installation W202: thin-se mortar; TCS W202.

C. Interior Floor Installations, Concrete Subfloor:

1. Tile Installation F113: Thin-set mortar; TCA F113.
   a. Thin-Set Mortar: Latex- portland cement mortar.
   b. Grout: Polymer-modified sanded grout.

2. Tile Installation F115: Thin-set mortar; epoxy grout; TCA F115.
   a. Thin-Set Mortar: Latex- portland cement mortar.
   b. Grout: Water-cleanable epoxy grout.

3. Tile Installation F121: Cement mortar bed (thickset) on waterproof membrane; TCA F121 and [ANSI A108.1A] [ANSI A108.1B] [ANSI A108.1C].
   a. Thin-Set Mortar for Cured-Bed Method: Latex- portland cement mortar.
   b. Grout: Polymer-modified sanded grout.

4. Tile Installation F122: Thin-set mortar on waterproof membrane; TCA F122.
   a. Thin-Set Mortar: Latex- portland cement mortar.
   b. Grout: Polymer-modified sanded grout.

5. Tile Installation F125A: Thin-set mortar on crack isolation membrane; TCA F125A.
   a. Thin-Set Mortar: Latex- portland cement mortar.
   b. Grout: Polymer-modified sanded grout.

D. Interior Wall Installations, on Studs or Furring:

1. Tile Installation W243: Thin-set mortar on gypsum board; TCA W243.
   a. Thin-Set Mortar: Latex- portland cement mortar.
   b. Grout: Polymer-modified sanded Polymer-modified unsanded grout.

2. Tile Installation W245: Thin-set mortar on coated glass-mat, water-resistant gypsum backer board; TCA W245.
   a. Thin-Set Mortar: Latex- portland cement mortar.
   b. Grout: Polymer-modified sanded Polymer-modified unsanded Water-cleanable epoxy grout.

E. Bathtub/Shower Wall Installations, Metal Studs or Furring:

1. Tile Installation B419: Thin-set mortar on coated glass-mat, water-resistant backer board; TCA B419.
   a. Thin-Set Mortar: Latex- portland cement mortar.
   b. Grout: Polymer-modified unsanded Water-cleanable epoxy grout.

F. Shower Receptor and Wall Installations, Concrete or Masonry:

1. Tile Installation B414: Cement mortar bed (thickset); TCA B414 and ANSI A108.1B .
   a. Thin-Set Mortar for Cured-Bed Method: Latex- portland cement mortar.
   b. Grout: Polymer-modified sanded grout.

2. Tile Installation B421: Thin-set mortar on waterproof membrane; TCA B421.
   a. Thin-Set Mortar: Latex-portland cement mortar.
   b. Grout: Polymer-modified sanded Polymer-modified unsanded grout.

G. Shower Receptor and Wall Installations, Metal Studs or Furring:

1. Tile Installation B420: Thin-set mortar on coated glass-mat, water-resistant backer board; TCA B420.
   a. Thin-Set Mortar: Latex- portland cement mortar.
   b. Grout: Polymer-modified sanded Polymer-modified unsanded grout.

END OF SECTION 093030

# SECTION 095113 - ACOUSTICAL PANEL CEILINGS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes
   1. Acoustical ceiling panels
   2. Exposed grid suspension system
   3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
   4. Perimeter Trim

B. Related Selections
   1. Section 09 2900 - Gypsum Board
   2. Divisions 23 - HVAC Air Distribution
   3. Division 26 - Electrical

### 1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
   2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
   3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
   4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
   5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
   6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
   7. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
   8. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
   9. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material

      A. Armstrong Fire Guard Products
   10. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
   11. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems

12. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
13. ASTM E 1264 Classification for Acoustical Ceiling Products

B. International Building Code

C. ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality

D. NFPA 70 National Electrical Code

E. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

F. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

G. International Code Council-Evaluation Services Report - Seismic Engineer Report

1. ESR 1308 - Armstrong Suspension Systems

H. International Association of Plumbing and Mechanical Officials - Seismic Engineer Report

1. 0244 - Armstrong Single Span Suspension System

1.3 SYSTEM DESCRIPTION

A. Continuous/Wall-to-Wall

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

C. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.

D. Shop Drawings: Layout and details of acoustical ceilings show locations of items that are to be coordinated with, or supported by the ceilings.

E. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

F. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.5 QUALITY ASSURANCE

A. **Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.**

1. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

2. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 Classification.

3. Fire Resistance: As follows tested per ASTM E119 and listed in the appropriate floor or roof design in the Underwriters Laboratories Fire Resistance Directory

B. Acoustical Panels: As with other architectural features located at the ceiling, may obstruct or skew the planned fire sprinkler water distribution pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.

C. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

**D. Certified Installer shall have not less than three (3) years of successful experience in the installation of ceiling suspension systems on projects with requirements similar to requirements specified.**

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.7 PROJECT CONDITIONS

A. Space Enclosure:

Standard Ceilings: Do not install interior ceilings until space is enclosed and weatherproof; wet work in place is completed and nominally dry; work above ceilings is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy. Building areas to receive ceilings shall be free of construction dust and debris.

1.8 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:

1. Acoustical Panels: Sagging and warping

2. Grid System: Rusting and manufacturer's defects

B. Warranty Period:

1. Acoustical panels: One **(30) years** from date of substantial completion.

2. Cirrus: Ten **(30) years** from date of substantial completion.

3. Grid: One **(30) years** from date of substantial completion.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.9 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.

2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

1.10 PERFORMANCE

**A. Acoustic Panels shall meet the following standards:**
   **a. Acoustical Tile Standard: Manufacturer's standard tiles shall be of configuration that complies with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance values.**

**B. Acoustic Panels shall meet the following standards regarding fire performance characteristics:**
   **a. Surface-Burning Characteristics: All Acoustical panels must comply with ASTM E 1264 for Class "A" materials, when tested per ASTM E 84.**
   **b. Fire-Rated Assembly: Design fire-rated ceiling systems according to tested firerated design.**
   **c. Design acoustical tile ceilings to comply with ASTM C 636, UL fire-rating**

**classification, UBC Standard 25-2 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."**

**C. Acoustic Panels shall meet the following standards regarding performance characteristics for bacteria and mold growth:**

**a. Specify acoustical tiles treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gramnegative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM G 21.**

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Ceiling Panels:

1. Basis of Design: **Armstrong World Industries, Inc.**
2. Approved equal prior to bid.

B. Suspension Systems:

1. Basis of Design: **Armstrong World Industries, Inc.**
2. Approved equal prior to bid.

C: Perimeter Systems

1. Basis of Design: **Armstrong World Industries, Inc.**
2. Approved equal prior to bid.

**2.2 ACOUSTICAL CEILING UNITS**

**A. Acoustical Panels, Basis of Design: Armstrong Optima Square Tegular. Refer to architectural reflected ceiling plan for locations of acoustical panel ceiling types.**

**Provide panels as follows:**

**1. Type ACT-1: 24" x 24"**

**Armstrong Optima Square Tegular**
**Surface Texture: Fine**
**Composition: Mineral Fiber**
**Color: White**

**B. Edge Profile: Tegular 15/16IN for interface with Prelude XL 15/16" Exposed Tee grid.**

2.3 METAL SUSPENSION SYSTEMS

A. Components: Main beams and cross tees, base metal and end detail, fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Main

beams and cross tees are double-web steel construction with exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.

1. Structural Classification: ASTM C 635 Intermediate Duty
2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
3. Acceptable Product: Prelude XL 15/16" Exposed Tee as manufactured by Armstrong World Industries

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 12 gauge.

D. Edge Moldings and Trim:

7800 - 12ft Wall Molding

2.4 ADDITIONAL REQUIREMENTS

**A. Specify extra material in full size units equal to 5.0 percent of quantity installed of ceiling panel and suspension system described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.**

**B. Provide all Seismic bracing required per code.**

**C. Gypsum wallboard bulkheads are allowed and should be clearly indicated on the reflected ceiling plans and detailed to show bracing conditions. Bulkheads constructed using the Acoustic Panel Ceiling System are not permitted.**

**D. All ceiling tiles shall be square and installed in an orthogonal direction to the space under consideration.**

**E. All ceiling tiles shall be centered in the room and in corridors. Limit partial tiles to 12 inches or greater.**

**F. All lighting, ceiling mounted devices, and sprinkler heads shall be centered in ceiling tiles.**

**G. Provide hold down clips for all tiles within areas where security is a primary concern. Verify all areas in question with the County prior to specification. Hold-down clips shall be compatible with ceiling panels specified. Specify minimum 12 ga., galvanized, soft annealed, mild steel hanger wire, 18 ga., galvanized, annealed steel tie wire. Prefabricated metal clamps for fastening to building structure. 16 ga. cold-rolled steel, carrying channels, 1-1/2" deep.**

**H. Do not support ceilings from ductwork, conduit, sprinkler piping, or any other equipment located in a plenum or above the finished ceiling. All wire ties must extend to structure above. Do not support any equipment load from the ceiling grid. Space hanger wires on main tees a maximum of 48" on center attaching hangers directly to structure above. A**

**hanger wire shall occur directly adjacent to the fire expansion notch on every main tee, and as required by Code or the local jurisdiction. Provide additional hanger wires where lighting fixtures and/or air supply and return units occur in ceiling.**

**I. Size attachment devices for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.**

**J. Edge Moldings shall be nominal 9/16" x 15/16" hemmed, prefinished angle molding, screw attached at intervals at not less than sixteen inches (16") on center and not more than three inches (3") from the end.**

**K. Exposed fasteners and pop rivets are not permitted.**

**L. Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.**

**M. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations A12-160GSB/12-2012 095000-3 finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.**

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

A. Follow manufacturer installation instructions.

B. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

C. Suspend main beam from overhead construction with hanger wires spaced 4-0 on center along the length of the main runner. Install hanger wires plumb and straight.

D. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

E. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

F. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

C. Before disposing of ceilings, contact the Armstrong Recycling Center at 877-276-7876, select option #1 then #8 to review with a consultant the condition and location of building where the ceilings will be removed. The consultant will verify the condition of the material and that it meets the Armstrong requirements for recycling. The Armstrong consultant with provide assistance to facilitate the recycle of the ceiling.

END OF SECTION 095113

# SECTION 096723 - RESINOUS FLOORING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes two resinous flooring systems, one with epoxy body and one with urethane-urea resin.

1. Application Method: Troweled screed, and sanded. Rubberized Terrazzo.

### 1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.

B. Samples for Verification: For each resinous flooring system required, 5 inches (150 mm) square, applied to a rigid backing by Installer for this Project.

C. Product Schedule: Use resinous flooring designations indicated in Part 2 and room designations indicated on Drawings in product schedule.

D. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

E. Maintenance Data: For resinous flooring to include in maintenance manuals.

### 1.4 QUALITY ASSURANCE

A. No request for substitution shall be considered that would change the generic type of floor system specified (i.e. urethane based rubberized terrazzo). Equivalent materials of other manufactures may be substituted only on approval of Architect or Engineer. Request for substitution will only be considered only if submitted 10 days prior to bid date. Request will be subject to specification requirements described in this section.

B. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.

1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
2. Contractor shall have completed at least 10 projects of similar size and complexity.

C. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, through one source from a single manufacturer, with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.

D. Manufacturer Field Technical Service Representatives: Resinous flooring manufacture shall retain the services of Field Technical Service Representatives who are trained specifically on installing the system to be used on the project.

1. Field Technical Services Representatives shall be employed by the system manufacture to assist in the quality assurance and quality control process of the installation and shall be available to perform field problem solving issues with the installer.

E. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Apply full-thickness mockups on 48-inch- (1200-mm-) square floor area selected by Architect.

a. Include 48-inch (1200-mm) length of integral cove base.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Pre-installation Conference:

1. General contractor shall arrange a meeting not less than thirty days prior to starting work.

2. Attendance:

a. General Contractor

b. Architect/Owner's Representative.
c. Manufacturer/Installer's Representative.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

B. Store materials to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects. Store material per Product Data sheet.

C. All materials used shall be factory pre-weighed and pre-packaged in single, easy to manage batches to eliminate on site mixing errors. No on site weighing or volumetric measurements allowed.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

1. Maintain material and substrate temperature between 65 and 85 deg F (18 and 30 deg C) during resinous flooring application and for not less than 24 hours after application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.

C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

D. Concrete substrate shall be properly cured. A vapor barrier must be present for concrete subfloors on or below grade. Otherwise, an osmotic pressure resistant grout must be installed prior to the resinous flooring.

1.7 WARRANTY

A. Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of one (1) one full years from date of installation, or provide a joint and several warranty signed on a single document by material manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of (1) one full year from date of installation. A sample warranty letter must be included with bid package or bid may be disqualified.

PART 2 - PRODUCTS

2.1 RESINOUS FLOORING

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, the following:

B. Products: Provide the following:

1. Stonhard, Inc.; Stonres RTZ®.

2. Sherwin-Williams Company, General Polymers. Ceramic Carpet #400.

3. Sika Corporation; Sikafloor 265 Flexible Epoxy Membrane, Sikafloor Quartzite System, Sikafloor 510 topcoat.

4. Durex Coverings, Inc.; Mosaix Floor #190 with DX-470 Chemical Resistant Polyaspartic Top Coat.
5. Life Sciences Products Inc. SeamTek Type 4 Epoxy Quartz Flooring.

C. System Characteristics:

1. Color and Pattern: As indicated by Architect in finish legend drawings.
2. Wearing Surface: Smooth Rubberized.
3. Integral Cove Base: TBD
4. Overall System Thickness: 3/16 inch.

D. System Components: Manufacturer's standard components that are compatible with each other and as follows:

1. Primer Coat:

    a. Material Basis: Stonhard Standard Primer.
    b. Resin: (2) two component epoxy.
    c. Formulation Description: 100 percent solids.
    d. Application Method: squeegee back roll.
    e. Number of Coats: One.

2. Primer Coat 2:

    a. Material Basis: Stonhard SL Primer.
    b. Resin: (3) three component epoxy.
    c. Formulation Description: 100 percent solids.
    d. Application Method: squeegee back roll onto wet standard primer.
    e. Number of Coats: One.

3. Formulation Description: Body Coat:

    a. Material Basis: Stonres Mortar base.
    b. Resin: Urethane
    c. Formulation Description: Comprised of a (3) three component mortar, consisting of pigmented urethane resin, curing agent, and rubber aggregates,
    d. Application Method: Screed Rake

        1) Free-Flowing Mortar: Uniformly spread mortar over substrate using manufacturer's specially designed screed rake adjusted to manufacturer's recommended height. Spike roll the mortar to remove any rake lines, using manufacturer's specially designed spike roller.
        2) Sanding: Sand surface of the cured mortar according to manufacturer's recommended equipment and procedures.

4. Grout coat:

    a. Material Basis: Stonres grout coat.
    b. Resin: Urethane
    c. Formulation Description: (2) two-component, 100% aliphatic, polyaspartic urethane.

d. Type: Clear
e. Finish: Matte.
f. Number of Coats: One.

5. Topcoat: Chemical resistant and high UV stability.

a. Material Basis: Stonseal GS7 clear flat.
b. Resin: Aliphatic polyurethane.
c. Formulation Description: (2) two-component, waterborne, flat, aliphatic polyurethane topcoat.
d. Type: Clear
e. Finish: Matte.
f. Number of Coats: one.

Note: Components listed above are the basis of design intent; all bids will be compared to this standard including resin chemistry, color, wearing surface, thickness, and installation procedures, including number of coats. Contractor shall be required to comply with all the requirements of the Specifications and all of the components required by the Specifications, whether or not such products are specifically listed above.

E. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:

1. Static load Limit: 0.004in/0.1mm.
2. Resistance to Heat: Delta E>8 per ASTM F-970.
3. Hardness: 85 Min. per ASTM D-2240/Shore A Durometer.
4. Residual Indentation: 1% thickness per ASTM F- 1914.
5. Noise Reduction Coefficient: 0.05 per ASTM C-423.
6. Abrasion Resistance: 0.01gm per ASTM D-3389, H-18 500g, 1000 cycles.
7. Fire Resistance: Class 1, Per ASTM E-648.
8. Percent Elongation: 150% per ASTM D-638.
9. Thermal Coefficient of Linear Expansion: 3.3 x 10^-5 in./in. . F per ASTM C-531

## 2.2 ACCESSORY MATERIALS

A. Pitching and Leveling: Use a (3) three component fast setting trowel able epoxy grout. Resinous epoxy based grout designed for permanent repairs under flooring system. Stonhard, Stonset TG 5. See drawings for fill locations. Use standard drain details, saw cut and chase.

B. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.

# PART 3 - EXECUTION

## 3.1 PREPARATION

A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

1. Mechanically prepare substrates as follows:

    a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup or Diamond Grind with dust free system.

2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.

3. Verify that concrete substrates are dry.

    a. Perform in situ probe test, ASTM F 2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 80 percent.
    b. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 6 lb of water/1000 sq. ft. of slab in 24 hours.
    c. Perform additional moisture tests recommended by manufacturer. Proceed with application only after substrates pass testing.

C. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.

D. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations. Allowances for Stonproof CT5.

## 3.2 APPLICATION

A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.

1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.

    a. Apply joint sealant to comply with manufacturer's written recommendations.

B. Apply SL Primer over prepared substrate at manufacturer's recommended spreading rate wet on wet application.

C. Integral Cove Base: High performance, mortar consisting of epoxy resin, curing agent and selected, graded aggregates blended with inorganic pigments, high solids epoxy mortar system. Top coat with Stonseal GS7, pigmented urethane top coat

D. Apply cove base mix to wall surfaces before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, and troweling, sanding, and top coating of cove base. Round internal and external corners.

E. Free-Flowing Mortar: Mix mortar material according to manufacturer's recommended procedures. Uniformly spread mortar over substrate using manufacturer's specially designed screed rake adjusted to manufacturer's recommended height. Spike roll the mortar to remove any rake lines, using manufacturer's specially designed spike roller.

F. Sanding: Sand surface of the cured mortar according to manufacturer's recommended equipment and procedures. Thoroughly clean and vacuum the surface of the base once all sanding has been completed.

G. Grout coat: Mix and apply sealer with strict adherence to manufacturer's installation procedures and coverage rates.

H. Topcoat: Mix and roller apply the topcoat with strict adherence to manufacturer's installation procedures and coverage rates.

## 3.3 TERMINATIONS

A. Chase edges to "lock" the coating system into the concrete substrate along lines of termination.

B. Penetration Treatment: Lap and seal coating onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.

C. Trenches: Continue coating system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.

D. Treat floor drains by chasing the coating to lock in place at point of termination.

## 3.4 JOINTS AND CRACKS

A. Treat control joints and to maintain monolithic protection.

B. Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.

C. Discontinue floor coating system at vertical and horizontal contraction and expansion joints by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

3.5 FIELD QUALITY CONTROL

A. Material Sampling: Owner may at any time and any numbers of times during resinous flooring application require material samples for testing for compliance with requirements.

1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's product data.
3. If test results show applied materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

3.6 CLEANING, PROTECTING, AND CURING

A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 24 hours.

B. Protect resinous flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's recommendations for protective materials and method of application. General Contractor is responsible for protection and cleaning of surfaces after final coats.

C. Cleaning: Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer. General contractor is responsible for cleaning prior to inspection.

END OF SECTION 096723

# SECTION 096813 - TILE CARPETING

## PART 1 – GENERAL

### 1.01 SUMMARY

A. Related Documents: Drawings and general provisions of the Contract.

B. As part of the institution's sustainability strategy, the owner intends to create a circular economic for as much of its facilities supply chain as possible. A key part of that circular economic model includes the owner's plans to recycle 100% of their existing and future plastic flooring inventory as it becomes available for replacement. Depending on the deferred maintenance cycle (10-15 years), the effort will result in the institution moving the physical footprint to a carbon free, glue free, floor prep free, incineration free flooring program.

C. The owner recognizes the existence of embodied carbon inside building materials and is intent on working to lower those Scope 3 emissions whenever possible.

D. The successful manufacturer will have implemented a focused and systematic effort to reduce their overall environmental footprint. In order to eliminate greenwash, the manufacturer must be able to clearly articulate their company-wide goals and achievements with specific performance against historical benchmarks.

E. Execution of this circular economic model will result in the elimination of tons of carbon emissions, carpet landfill burden, constructive use of tons of additional recycled content, the elimination of glue buckets and reduced floor prep expenses.

F. This is a *non-proprietary* specification. However, owner reserves the right to analyze all products using metrics that truly matter, and ultimately use the most environmentally friendly alternative submitted.

### 1.02 SUBMITTALS

B. Shop drawings shall be submitted to Architect/Owner for approval prior to installation of floor. Randomly installed modular products are preferred due to elimination of dye lots, minimization of waste and ease of repair/replacement. Manufacturer will inform Architect/Owner of projected trim waste on project prior to bid. Copy of approved shop drawings to be available on job site during installation.

C. Floor schedule using same room designations indicated on drawings.

D. Product Data: Provide data on specified products, describing physical and performance characteristics, sizes, patterns, colors available, method of installation and sustainability attributes.

E. Verification Samples: Submit samples illustrating color and pattern for each carpet material specified.

F. Manufacturer's Installation Instructions

G. Maintenance Data: Include maintenance procedures, recommendations for maintenance materials and equipment, suggested schedule for cleaning and include any information relative to water use, contamination and runoff.

H. Manufacturer's Product Warranty: **15 years from date of Substantial Completion.**

I. Carbon Neutral Certificate stating how many tons of embodied CO2 are sequestered.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications

1. Company specializing in manufacturing specified carpet with minimum 15 years documented experience in the production of modular carpet.

2. Upon request, manufacturer to provide representative to assist in project start-up and to inspect installation while in process and upon completion. Representative will notify designated contact if any installation instructions are not followed.

3. Manufacturer must provide verification of its registration to the ISO 9001 Quality Management System

4. Manufacturer must state (as a submittal) their total company's improvement of, or reduction in the following environmental categories (global footprint), over the last ten years minimum:

    a) Product carbon footprint
    b) Overall energy reduction
    c) Percent of renewable energy used (of total energy consumption)
    d) GHG emissions at all manufacturing sites
    e) Raw materials from bio-based or recycled materials
    f) Water Use
    g) Post-consumer carpet diverted from landfill
    h) Manufacturing waste sent to landfill

B. Installer Qualifications

1. Flooring contractor to be a specialty contractor normally engaged in this type of work and shall have prior experience in the installation of these types of materials.

2. Flooring contractor possessing Contract for the product installation shall not sub-contract the labor without written approval of the Project Manager.

3. Flooring contractor will be responsible for proper product installation, including floor testing and preparation as specified by the manufacturer.

5. Flooring contractor to provide Owner a written installation warranty that guarantees the completed installation to be free from defects in materials and workmanship for a period of one year after job completion.

6. Flooring contractor to provide Owner a report of all recycling activity.

1.04 DELIVERY, STORAGE, & HANDLING

A. Deliver materials to the site in manufacturer's original packaging listing manufacturer's name, product name, identification number, and related information.

B. Store in a dry location, between 65 degrees F and 90 degrees F and a relative humidity below 65%. Protect from damage and soiling.

C. Make stored materials available for inspection by the Owner's representative.

D. Store materials in area of installation for minimum period of 48 hours prior to installation.

1.05 PROJECT CONDITIONS

A. Sub-floor preparation is to include all required work to prepare the existing floor for installation of the product as specified in this document and Manufacturer's installation instructions.

B. All material used in sub-floor preparation and repair shall be recommended by the carpet manufacturer and shall be chemically and physically compatible with the carpet system being bid.

C. Maintain minimum 65 degrees F ambient temperature and 65% Relative Humidity for 72 hours prior to, during, and 48 hours after installation.

D. Do not install flooring until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

1.06 EXTRA MATERIALS

A. Provide additional 5% carpet for "attic stock"

PART 2 – PRODUCTS

2.01 RECYCLED CONTENT

A. The highest post-consumer recycled content is preferred in both backing and fiber. If post-consumer content is not available, consideration will be given to the product with highest post-industrial content.

B. Manufacturer must clearly itemize the amount of post-consumer content v. post-industrial content.

C. Recycled content must be certified by a neutral, independent, third party organization.

2.02 RECYCLABILITY & RECYCLING PROGRAM

A. Product should be one hundred percent (100%) closed-loop recyclable back into flooring.

B. Flooring must be installed glue free without full spread wet adhesives to prevent backing contamination and allow for "clean recycling". Products whose removal requirements or processes may damage sub-floor will not be considered.

C. Manufacturer must maintain and operate a recycling effort capable of reclaiming and recycling 100% of installed carpet. First choice is repurposing, provided carpet is in usable condition. Second choice is closed loop recycling turning carpet into carpet. Third choice is waste to energy. In all cases, landfill is the last alternative is landfill. A written plan, in accordance with this options, must be approved by owner in writing prior to award.

2.03 PRODUCT WARRANTY

A. Warranty to be sole source responsibility of the Manufacturer.

B. If the product fails to perform as warranted when properly installed and maintained, the affected area will be repaired or replaced at the discretion of the Manufacturer.

C. Chair pads should not be required as a condition of warranty.

D. Warranty shall not exclude carpet product installed on stairs provided it is properly installed and maintained.

E. The 15 year non-prorated warranty shall specifically warrant:

1. Against loss of more than 10% by weight of face fiber
2. Against edge ravel, backing separation, shrinking, stretching, cupping, doming and
3. Against excessive static electricity
4. Antimicrobial effectiveness.
5. 100% solution dyed yarns against excessive color loss

2.04 FIBER

A. Nylon Fiber: 100% Solution Dyed Bulked Continuous Filament (BCF) Nylon Type 6 or Type 6,6

B. Modification ratio of 2.2 or less.

C. Carpet with yarn dyed (100% or blends), piece-dyed or printed fiber should be avoided due to potential loss of color and unnecessary water usage, resulting effluents and energy consumed in manufacturing process.

D. 100% non-virgin fiber is preferred.

E. Stain inhibitor should be applied to the fiber during fiber manufacturing to resist staining and soiling.

2.05 BACKING CHARACTERISTICS

A. Backing should be inherently stable, free lay and require little to no wet adhesion applied to subfloor, thereby eliminating any future floor preparation expenses for the owner. The product should be installed without glue such that backing contamination does not occur and easy removal, reclamation and clean recycling into new carpet tile can be expedited.

B. Primary Backing: Non-woven synthetic, latex and preservative protection

C. Secondary Backing: Thermoplastic with fiberglass reinforcement. An operational recycling technology of this backing system must be in place and commercially available for consideration.

D. Product Size: 50cm by 50cm, 1m by 50cm, 1m by 25 cm, 1m by 1m. All products must be interchangeable inside a consistent grid: soft & hard surface

E. Impervious to moisture

F. No delamination

2.06 PERFORMANCE CHARACTERISTICS

A. Test reports for the following performance assurance testing to be submitted upon request.

Submitted results shall represent average results for production goods of the referenced style. Requirements listed below must be met by all products.

1. Flooring Radiant Panel
   ASTM E-648 / NFPA 253: Class 1 (CRF: 0.45 watts/sq cm or greater)
2. Federal Flammability
   CPSC FF 1-70: Passes
3. Smoke Density
   ASTM E-662 / NFPA 258: < 450 Flaming Mode
4. Electrostatic Propensity
   AATCC 134 (Step & Scuff): 3.0 kV or less
5. Lightfastness
   AATCC 16E: 4 @ 100 hours solution dyed
6. TARR
   3.0 Minimum
7. Dimensional Stability
   ISO 2551/ASTM D 7570 Dimensional Stability <.10%

2.07 PRODUCT MANUFACTURING SPECIFICATIONS

**J+J Flooring**
**(404) 747-7731**
**3404 Oakcliff Rd # C1, Atlanta, GA 30340**

Manufacturer will meet the following construction requirements:

A. Construction: Tufted
B. Gauge: 12th Gauge
C. Dye Method: 100% Solution Dyed
D. Dye Lots: Guaranteed mergeable
E. Preservative: Permanent, organically based, compounded in primary backing layer
F. Carbon Footprint: Neutral, as certified by 3rd party, across the full life cycle

Substitutes/Alternates

Subject to compliance with all requirements, "or equal" must match the selected colors, have similar aesthetic appearance. Substitution sample and submittals must be submitted for written approval of quality and color at least ten days prior to bid to be considered.

2.08 PRODUCT ENVIRONMENTAL SPECIFICATIONS

Manufacturer will provide data establishing the fact that their products are *equal to or below the industry average* for carpet tiles in the following categories, as denoted by publicly available third party certified Environmental Product Declarations (Per 3rd party verified Environmental Product Declaration following ISO 14025 guidelines, EPD with Product Category Rules (PCR) for Building-Related Products and Services - Part A: Calculation rules for the LCA and Requirements Project Report.

A. Embodied Carbon (global warming potential, GWP kg $CO_2$ equivalents)
B. Ozone Layer Depletion (ozone depletion potential, ODP kg CFC-11 equivalents)
C. Acid Rain (acidification potential of land and water, AP kg $SO_2$ equivalents)
D. Water pollution from nitrogen and phosphorus fertilizers (eutrophication potential, EP kg N equivalents)
E. Smog (smog formation potential, SFP kg $O_3$ equivalents)

Substitutes/Alternates

Subject to compliance with all requirements, "or equal" must have similar sustainability characteristics. Substitution sample and submittals must be submitted for written approval of quality and color at least ten days prior to bid to be considered.

2.09 ACCESSORIES

A. Materials recommended by Manufacturer for patching, priming, etc.

B. Transition strip free installation required. Carpet and hard surface of comparable total thickness should be installed adjacent to each other free of transition strips.

2.10 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

PART 3 EXECUTION

3.01 EXAMINATION / PREPARATION

A. Prepare sub-floor to comply with criteria established in Manufacturer's installation instructions. Use only preparation materials that are acceptable to the Manufacturer.

1. Remove all substances from sub-floor that would interfere with or be harmful to the installation.
2. Remove sub-floor ridges and bumps. Fill cracks, joints, holes, and other defects.

C. Verify that sub-floor is smooth and flat within specified tolerances and ready to receive carpet

D. Verify that substrate surface is dust-free

E. Verify that concrete surfaces are ready for installation by conducting moisture and pH testing. Results must be within limits recommended by Manufacturer.

F. There will be no exceptions to the provisions stated in the Manufacturer's installation instructions.

3.02 INSTALLATION - GENERAL

A. Install product in accordance with Manufacturer's installation instructions.

B. Adhesive must meet the requirements of CRI's Green Label Plus program for adhesive. Provide documentation.

C. Installation methodology will be VOC friendly for both installers & occupants of building

D. Trim carpet neatly at walls and around interruptions.

3.03 PROTECTION & CLEANING

A. Remove excess adhesive and/or seam sealer from floor and wall surfaces without damage.

B. All rubbish, wrappings, debris, trimmings, etc. to be removed from site and recycled or disposed of properly.

C. Clean and vacuum surfaces using a beater brush/bar commercial vacuum.

D. After each area of is installed, protect from soiling and damage by other trades.

3.04 RECYCLING

1.1 Scope of Work

Owner requires that existing carpet being removed and carpet trim waste from new installation be recycled in the best possible manner. A reclamation plan will be submitted to owner for approval at start of work. Said plan will provide directions for the reclamation of recyclable carpet at the job site.

A. First choice is repurposing, provided carpet is in usable condition
B. Second choice is closed loop recycling turning carpet into carpet
C. Third choice is waste to energy
D. Last alternative is landfill

1.2 Description of Services Collection (Labor): Carpet must be removed from the existing installation and prepared for pickup based on the type of material and reclamation option selected. Specifications for removal from the job site are as follows:

A. Removal of carpet tile for recycling

1. Carpet tile must be palletized and secured for shipping; shrink wrapped, banded, strapped.
2. Pallets must be a minimum size of 40"x40" and material stacked approximately 54" high.
3. Pallets cannot be double stacked in the trailer.
4. Tile must be kept dry and free of any moisture damage.
5. Trailers must be free of any non-carpet debris, construction waste, cardboard boxes, trash.
6. Material must not contain mold or mildew.
7. Wet carpet will not be accepted.
8. Material must not contain vinyl asbestos or adhesives containing asbestos.

B. Removal of broadloom carpet for recycling

1. Less than full truckload quantities of broadloom (<3,000 yds) will need to be cut or rolled and secured to a pallet by shrink wrap or banding. Pallets must be a minimum size of 40"x40".
2. Full truckload quantities of broadloom (>3,000 yds) should be rolled and secured. The rolls should be neatly placed and stacked in the trailer.

3. Wet carpet will not be accepted.
4. Containers must be free of any non-carpet debris, construction waste, cardboard boxes, trash.
5. Material must not contain tac strips or metal staples.
6. Material must not contain mold or mildew.
7. Material must not contain vinyl asbestos or adhesives containing asbestos.

Material Loading: Shipper must load material on the carrier; drivers will not assist. Notification must be given prior to quote submittal of any special requirements such as liftgate, small trucks, etc. Additional fees will apply. Processing: All possible recycling options must be clearly presented and/or submitted on paper subsequent to job start. The accepted reclamation option must be approved in writing by the party requesting the services.

Certification: A certificate verifying the reclamation of the carpet and the pounds of material diverted from the landfill will be furnished upon request.

END OF SECTION 096813

# SECTION 099113 – EXTERIOR PAINTING

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates:

1. Concrete.
2. Fiber-cement board.
3. Clay masonry.
4. Concrete masonry units (CMU).
5. **Steel, paint all visible steel including but not limited to exterior gas meters and iron.**
6. Galvanized metal, including viable exterior gas meters.
7. Aluminum (not anodized or otherwise coated).
8. Stainless-steel flashing.
9. Wood.
10. Plastic trim fabrications.
11. Exterior portland cement plaster (stucco).
12. Exterior gypsum board.

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this section.
2. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.
3. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.
4. Section 099600 "High-Performance Coatings" for tile-like coatings.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Label each coat of each Sample.
3. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.4 CLOSEOUT SUBMITTALS

A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 1 gal. (3.8 L) of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacture's label with the following information:

1. Product name and type (description).
2. Batch date.
3. Color number.
4. VOC content.
5. Environmental handling requirements.
6. Surface preparation requirements.
7. Application instructions.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company (The); products indicated or comparable product from one of the following:

1. PPG Paints.

2. Benjamin Moore & Co.

3. Duron, Inc.

B. Comparable Products: Comparable products of approved manufacturers will be considered in accordance with Section 016000 "Product Requirements," and the following:

1. Products are approved by manufacturer in writing for application specified.
2. Products meet performance and physical characteristics of basis of design product including published ratio of solids by volume, plus or minus two percent.

C. Source Limitations: Obtain paint materials from single source from single listed manufacturer.

1. Manufacturer's designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. Colors: **As indicated on finish schedule on Drawing I110.**

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting

performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.

1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

B. Substrate Conditions:

1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

    a. Concrete: 12 percent.
    b. Fiber-Cement Board: 12 percent.
    c. Masonry (Clay and CMU): 12 percent.
    d. Wood: 15 percent.
    e. Portland Cement Plaster: 12 percent.
    f. Gypsum Board: 12 percent.

2. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
3. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

H. Aluminum Substrates: Remove loose surface oxidation.

I. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

J. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

## 3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be

applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:

a. Equipment, including panelboards and switch gear.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports. **(Discuss with Architect prior to painting)**
e. Metal conduit.
f. Plastic conduit.
g. Tanks that do not have factory-applied final finishes.
h. **Mechanical grills (Especially exterior louvers, etc.)**

## 3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

## 3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. **Exposed Concrete**, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Primer sealer, latex.

1) S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils (0.203 mm) wet, 3.2 mils (0.081 mm) dry.

b. Prime Coat: Latex, exterior, matching topcoat.
c. Intermediate Coat: Latex, exterior, matching topcoat.
d. Topcoat: Latex, exterior, flat.

1) S-W A-100 Exterior Latex Flat, A6 Series, at 4.0 mils (0.102 mm) wet, 1.2 mils (0.030 mm) dry, per coat.

e. Topcoat: Latex, exterior, low sheen.

1) S-W A-100 Exterior Latex Low Sheen, A12 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

f. Topcoat: Latex, exterior, satin.

1) S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

g. Topcoat: Latex, exterior, semi-gloss.

1) S-W Solo Acrylic Semi-Gloss, A76 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

h. Topcoat: Latex, exterior, gloss.

1) S-W A-100 Exterior Latex Gloss, A8 Series, at 4.0 mils (0.102 mm) wet, 1.3 mils (0.033 mm) dry, per coat.

2. Latex over Latex Aggregate System:

a. Prime Coat: Block Filler, Latex, Interior/Exterior.

1) S-W Loxon Block Surfacer, A24W200, at 50 to 100 sq. ft. per gal. (1.23 to 2.45 sq. m per liter).

b. Topcoat: Latex, exterior flat, **fine** texture.

1) S-W UltraCrete Textured Masonry Topcoat, A44-800 Series, 50 to 80 sq. ft. per gal. (1.23 to 1.96 sq. m per liter).

3. Concrete Stain System (Water-based):

a. First Coat: Low-luster opaque finish matching topcoat.

b. Topcoat: Low-luster opaque finish:

1) S-W H&C Colortop Water-Based Solid Color Concrete Stain, at 50 to 250 sq. ft. per gal. (1.23 to 6.14 sq. m per liter).

B. Concrete Substrates, Pedestrian Traffic Surfaces:

1. Latex Floor Paint System:

a. First Coat: Floor paint, latex, slip-resistant, matching topcoat.
b. Topcoat: Floor paint, latex, slip-resistant, low gloss.

1) S-W ArmorSeal Tread-Plex, B90 Series, at 1.5 to 2.0 mils (0.038 to 0.051 mm) dry per coat.

2. Concrete Stain System (Water-based) for Vertical Surfaces:

a. First Coat: Low-luster opaque finish matching top coat.
b. Topcoat: Low-luster opaque finish.

1) S-W H&C Colortop Water-Based Solid Color Concrete Stain, at 50 to 250 sq. ft. per gal. (1.23 to 6.14 sq. m per liter).

C. CMU Substrates:

1. Latex System:

a. Block Filler: Block filler, latex, interior/exterior:

1) S-W PrepRite Block Filler, B25W25, at 75 to 125 sq. ft. per gal. (1.84 to 3.07 sq. m per liter).

b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat.

1) S-W A-100 Exterior Latex Flat, A6 Series, at 4.0 mils (0.102 mm) wet, 1.2 mils (0.030 mm) dry, per coat.

d. Topcoat: Latex, exterior, low sheen.

1) S-W A-100 Exterior Latex Low Sheen, A12 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

e. Topcoat: Latex, exterior, satin.

1) S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

f. Topcoat: Latex, exterior, semi-gloss.

1) S-W Solo Acrylic Semi-Gloss, A76 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

g. Topcoat: Latex, exterior, gloss.

1) S-W A-100 Exterior Latex Gloss, A8 Series, at 4.0 mils (0.102 mm) wet, 1.3 mils (0.033 mm) dry, per coat.

2. CMU Stain System (Water-Based):

a. First Coat: Low-luster opaque finish matching topcoat.
b. Topcoat: Low-luster opaque finish.

1) S-W H&C Colortop Water-Based Solid Color Concrete Stain, at 50 to 250 sq. ft. per gal. (1.23 to 6.14 sq. m per liter).

D. Galvanized-Metal, and Aluminum Substrates:

1. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, water based.

1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, 5.0 to 10.0 mils (0.127 to 0.254 mm) wet, 2.0 to 4.0 mils (0.051 to 0.102 mm) dry.

b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
c. Topcoat: Light industrial coating, exterior, water based eggshell.

1) S-W Pro Industrial Eg-Shel Acrylic B66-660 Series, at 2.5 to 4.0 mils (0.064 to 0.102 mm) dry, per coat.

d. Topcoat: Light industrial coating, exterior, water based, semi-gloss.

1) S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils (0.064 to 0.102 mm) dry, per coat.

e. Topcoat: Light industrial coating, exterior, water based, gloss.

1) S-W Pro Industrial Acrylic Gloss Coating, B66-600 Series, at 2.5 to 4.0 mils (0.064 to 0.102 mm) dry, per coat.

E. Wood Substrates: Including exposed wood items not indicated to receive shop-applied finish.

1. Latex System:

a. Prime Coat: Primer, latex for exterior wood.

1) S-W Exterior Latex Primer, B42, at 4.0 mils (0.102 mm) wet, 1.4 mils (0.036 mm) dry, per coat.

b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat:

1) S-W A-100 Exterior Latex Flat, A6 Series, at 4.0 mils (0.102 mm) wet, 1.2 mils (0.030 mm) dry, per coat.

d. Topcoat: Latex, exterior, low-sheen:

1) S-W A-100 Exterior Latex Low Sheen, A12 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

e. Topcoat: Latex, exterior, satin:

1) S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

f. Topcoat: Latex, exterior, semi-gloss:

1) S-W Solo Acrylic Semi-Gloss, A76 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

g. Topcoat: Latex, exterior, gloss:

1) S-W A-100 Exterior Latex Gloss, A8 Series, at 4.0 mils (0.102 mm) wet, 1.3 mils (0.033 mm) dry, per coat.

F. Wood Substrates, Pedestrian Traffic Surfaces:

1. Latex Floor Paint System:

a. First Coat: Floor paint, latex, slip-resistant, matching topcoat.
b. Topcoat: Floor paint, latex, slip-resistant, low gloss:

1) S-W ArmorSeal Tread-Plex, B90 Series, at 1.5 to 2.0 mils (0.038 to 0.051 mm) dry per coat.

2. Solid Color Stain System:

a. First Coat: Solid color stain, latex, matching topcoat.
b. Topcoat: Solid color stain, latex, slip-resistant, flat, interior/exterior:

1) S-W SuperDeck Exterior Acrylic Solid Color Deck, SD7-Series, at 200 to 400 sq. ft. per gal. (4.91 to 37.16 sq. m per liter).

G. Plastic Trim Fabrication Substrates: Including architectural PVC, plastic, and fiberglass items.

1. Latex System:

a. Prime Coat: Primer, bonding, water-based:

1) S-W PrepRite ProBlock Latex Primer/Sealer, B57-620 Series, at 4.0 mils (0.102 mm) wet, 1.4 mils (0.036 mm) dry.

b. Intermediate Coat: Latex, exterior, matching topcoat.
a. Topcoat: Latex, exterior, flat:

1) S-W A-100 Exterior Latex Flat, A6 Series, at 4.0 mils (0.102 mm) wet, 1.2 mils (0.030 mm) dry, per coat.

b. Topcoat: Latex, exterior, low-sheen:

1) S-W A-100 Exterior Latex Low Sheen, A12 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

c. Topcoat: Latex, exterior, satin:

1) S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

d. Topcoat: Latex, exterior, semi-gloss:

1) S-W Solo Acrylic Semi-Gloss, A76 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

e. Topcoat: Latex, exterior, gloss:

1) S-W A-100 Exterior Latex Gloss, A8 Series, at 4.0 mils (0.102 mm) wet, 1.3 mils (0.033 mm) dry, per coat.

H. Exterior Gypsum Board Substrates:

1. Latex System:

a. Prime Coat: Primer bonding, water-based.

1) S-W PrepRite ProBlock Latex Primer/Sealer, B57-620 Series, at 4.0 mils (0.102 mm) wet, 1.4 mils (0.036 mm) dry.

b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, flat.

1) S-W A-100 Exterior Latex Flat, A6 Series, at 4.0 mils (0.102 mm) wet, 1.2 mils (0.030 mm) dry, per coat.

d. Topcoat: Latex, exterior, low-sheen.

1) S-W A-100 Exterior Latex Low Sheen, A12 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

e. Topcoat: Latex, exterior, satin:

1) S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

f. Topcoat: Latex, exterior, semi-gloss.

1) S-W Solo Acrylic Semi-Gloss, A76 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

g. Topcoat: Latex, exterior, gloss.

1) S-W A-100 Exterior Latex Gloss, A8 Series, at 4.0 mils (0.102 mm) wet, 1.3 mils (0.033 mm) dry, per coat.

END OF SECTION 099113

# SECTION 099123 – INTERIOR PAINTING

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete.
2. Clay masonry.
3. Concrete masonry units (CMU).
4. Steel
5. Cast iron.
6. Galvanized metal.
7. Aluminum (not anodized or otherwise coated).
8. Wood.
9. Gypsum board.
10. Plaster.
11. Spray-textured ceilings.
12. Cotton or canvas insulation covering.
13. ASJ insulation covering.

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this section.
2. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.
3. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.
4. Section 099600 "High-Performance Coatings" for tile-like coatings.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Indicate VOC content.

C. Samples for Initial Selection: For each type of topcoat product.

D. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Label each coat of each Sample.
3. Label each Sample for location and application area.

E. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Indicate VOC content.

1.4 CLOSEOUT SUBMITTALS

1. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 1 gal. (3.8 L) of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer's label with the following information:

1. Product name and type (description).
2. Batch date.
3. Color number.
4. VOC content.
5. Environmental handling requirements.
6. Surface preparation requirements.
7. Application instructions.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

C. Lead Paint: It is not expected that lead paint will be encountered in the Work.

1. If suspected lead paint is encountered, do not disturb; immediately notify Architect and Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company (The); products indicated or comparable product from one of the following:

1. PPG Paints.

2. Benjamin Moore & Co.

3. Duron, Inc.

B. Comparable Products: Comparable products of approved manufacturers will be considered in accordance with Section 016000 "Product Requirements," and the following:

1. Products are approved by manufacturer in writing for application specified.
2. Products meet performance and physical characteristics of basis of design product including published ratio of solids by volume, plus or minus two percent.

C. Source Limitations: Obtain paint materials from single source from single listed manufacturer.

1. Manufacturer's designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

## 2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

D. Colors: **As indicated on finish schedule on Drawing I110.**

## 2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.

1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

B. Substrate Conditions:

1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

a. Concrete: 12 percent.
b. Masonry (Clay and CMU): 12 percent.
c. Wood: 15 percent.
d. Gypsum Board: 12 percent.
e. Plaster: 12 percent.

2. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
3. Plaster Substrates: Verify that plaster is fully cured.
4. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

1. Concrete Floors: Remove oil, dust, grease, dirt, and other foreign materials. Comply with SSPC-SP-13/NACE 6 or ICRI 03732.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

H. Aluminum Substrates: Remove loose surface oxidation.

I. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

J. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

## 3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

    a. Equipment, including panelboards and switch gear.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports. **(Discuss with Architect prior to painting)**
    e. Metal conduit. (Discuss with Architect prior to painting)
    f. Plastic conduit.
    g. Tanks that do not have factory-applied final finishes.
    h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    **i. Mechanical grills (to match adjacent color.)**

2. Paint the following work where exposed in occupied spaces: **(Discuss with Architect prior to painting. However, the following to be included in Bid.)**

    a. Equipment, including panelboards.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.
    e. Metal conduit.
    f. Plastic conduit.
    g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    h. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

## 3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing

and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR MICROBICIDAL PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Microbicidal Latex Finish System: With topcoat EPA registered No. 64695-1.

a. Prime Coat: Primer sealer, latex, interior:

1) S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils (0.203 mm) wet, 3.2 mils (0.081 mm) dry.

b. First Coat: Microbicidal Latex, interior, matching topcoat.
c. Topcoat: Microbicidal Latex, interior, eggshell:

1) S-W Paint Shield Interior Latex Eg-Shel Microbicidal Paint, D12W51, at 4.0 mils (0.102 mm) wet, 1.8 mils (0.046 mm) dry, per coat. Brush and roll application only.

B. CMU Substrates:

1. Microbicidal Latex Finish System: With topcoat EPA registered No. 64695-1.
a. Block Filler: One or two coats as required: Block filler, latex, interior/exterior:

1) S-W Loxon Block Surfacer, A24W200, at 10.0 mils (0.254 mm) wet, 8.0 mils (0.203 mm) dry, per coat.

b. First Coat: Microbicidal Latex, interior, matching topcoat.
c. Topcoat: Microbicidal Latex, interior, eggshell:

1) S-W Paint Shield Interior Latex Eg-Shel Microbicidal Paint, D12W51, at 4.0 mils (0.102 mm) wet, 1.6 mils (0.041 mm) dry, per coat. Brush and roll application only.

C. Wood Substrates: Including exposed wood items not indicated to receive shop-applied finish.

1. Microbicidal Latex Finish System: With topcoat EPA registered No. 64695-1.

a. Prime Coat: Primer, latex, interior, anti-microbial:

1) S-W PrepRite ProBlock Interior/Exterior Latex Primer/Sealer, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry.

b. First Coat: Microbicidal Latex, interior, matching topcoat.
c. Topcoat: Microbicidal Latex, interior, eggshell:

1) S-W Paint Shield Interior Latex Eg-Shel Microbicidal Paint, D12W51, at 4.0 mils (0.102 mm) wet, 1.8 mils (0.046 mm) dry, per coat. Brush and roll application only.

D. **Gypsum Board** Substrates:

1. Microbicidal Latex Finish System: With topcoat EPA registered No. 64695-1.

a. Prime Coat: Primer, latex, interior:

1) S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils (0.102 mm) wet, 1.0 mils (0.025 mm) dry.

b. First Coat: Microbicidal Latex, interior, matching topcoat.
c. Topcoat: Microbicidal Latex, interior, eggshell:

1) S-W Paint Shield Interior Latex Eg-Shel Microbicidal Paint, D12W51, at 4.0 mils (0.102 mm) wet, 1.8 mils (0.046 mm) dry, per coat. Brush and roll application only.

3.7 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Primer, latex, interior.

1) S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils (0.203 mm) wet, 3.2 mils (0.081 mm) dry.

b. Intermediate Coat: Latex, interior, matching topcoat.

c. Topcoat: Latex, interior, flat.

1) S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series, at 4.0 mils (0.102 mm) wet, 1.6 mils (0.041 mm) dry, per coat.

d. Topcoat: Latex, interior, low sheen.

1) S-W ProMar 200 Zero VOC Latex Low Sheen Eg-Shel, B24-2600 Series, at 4.0 mils (0.102 mm) wet, 1.6 mils (0.041 mm) dry, per coat.

e. Topcoat: Latex, interior, eggshell.

1) S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils (0.102 mm) wet, 1.7 mils (0.043 mm) dry, per coat .

f. Topcoat: Latex, interior, semi-gloss.

1) S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils (0.102 mm) wet, 1.6 mils (0.041 mm) dry, per coat .

g. Topcoat: Latex, interior, gloss.

1) S-W ProMar 200 Zero VOC Gloss, B21-12650 Series, at 4.0 mils (0.102 mm) wet, 1.4 mils (0.036 mm) dry, per coat.

2. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer sealer, latex, interior:

1) S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils (0.203 mm) wet, 3.2 mils (0.081 mm) dry.

b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.

c. Topcoat: Light industrial coating, interior, water based, eggshell:

1) S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

d. Topcoat: Light industrial coating, interior, water based, semi-gloss:

1) S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

3. Two-Component Epoxy and Epoxy High Build Systems for Non-Traffic Surfaces: Refer to Section 099600 "High-Performance Coatings."

4. Concrete Stain System (Water-based) for Vertical Surfaces:

a. First Coat:

1) S-W H&C Colortop Water-Based Solid Color Concrete Stain, at 50 to 300 sq. ft. per gal. (1.23 to 7.36 sq. m per liter).

b. Second Coat:

1) S-W H&C Colortop Water-Based Solid Color Concrete Stain, at 50 to 300 sq. ft. per gal. (1.23 to 7.36 sq. m per liter).

B. Concrete Substrates, Pedestrian Traffic Surfaces:

1. Latex Floor Enamel System:

    a. First Coat: Floor paint, latex, slip-resistant, matching topcoat.
    b. Topcoat: Floor paint, latex, slip-resistant, low gloss: S-W ArmorSeal Tread-Plex, B90 Series, at 1.5 to 2.0 mils (0.038 to 0.051 mm) dry per coat.

2. Clear Acrylic System, Gloss Finish:

    a. First Coat:

        1) S-W H&C Clarishield Water-Based Wet-Look Concrete Sealer, at 100 to 200 sq. ft. per gal. (2.45 to 4.91 sq. m per liter).

    b. Second Coat:

        1) S-W H&C Clarishield Water-Based Wet-Look Concrete Sealer, at 100 to 200 sq. ft. per gal. (2.45 to 4.91 sq. m per liter).

3. Concrete Stain System (Water-based):

    a. First Coat: Low-luster opaque finish:

        1) S-W H&C Colortop Water-Based Solid Color Concrete Stain, at 50 to 300 sq. ft. per gal. (1.23 to 7.36 sq. m per liter).

    b. Second Coat: Low-luster opaque finish:

        1) S-W H&C Colortop Water-Based Solid Color Concrete Stain, at 50 to 300 sq. ft. per gal. (1.23 to 7.36 sq. m per liter).

4. Epoxy and Urethane Coatings: Refer to Section 099600 "High-Performance Coatings."
5. Epoxy- and Urethane- Based Aggregate-Filled Floor Surfacing: Refer to Section 09 67 23 "Resinous Flooring."

C. CMU Substrates:

1. Latex System:

    a. Block Filler: Block filler, latex, interior/exterior:

        1) S-W PrepRite Block Filler, B25W25, at 75-125 sq. ft. per gal. (1.84 to 3.07 sq. m per liter).

    b. Intermediate Coat: Latex, interior, matching topcoat.
    c. Topcoat: Latex, interior, flat:

        1) S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series, at 4.0 mils (0.102 mm) wet, 1.6 mils (0.041 mm) dry, per coat.

    d. Topcoat: Latex, interior, low sheen:

1) S-W ProMar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series, at 4.0 mils (0.102 mm) wet, 1.6 mils (0.041 mm) dry, per coat.

e. Topcoat: Latex, interior, eggshell:

1) S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils (0.102 mm) wet, 1.7 mils (0.043 mm) dry, per coat.

f. Topcoat: Latex, interior, semi-gloss:

1) S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils (0.102 mm) wet, 1.6 mils (0.041 mm) dry, per coat.

g. Topcoat: Latex, interior, gloss:

1) S-W ProMar 200 Zero VOC Gloss, B21-12650 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

2. Water-Based Light Industrial Coating System:

a. Block Filler: Block filler, latex, interior/exterior:

1) S-W PrepRite Block Filler, B25W25, at 75-125 sq. ft. per gal. (1.84 to 3.07 sq. m per liter).

b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.

c. Topcoat: Light industrial coating, interior, water based, eggshell:

1) S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

d. Topcoat: Light industrial coating, interior, water based, semi-gloss:

1) S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

3. Concrete Stain System (Water-based):

a. First Coat:

1) S-W H&C Colortop Water-Based Solid Color Concrete Stain, at 50 to 300 sq. ft. per gal. (1.23 to 7.36 sq. m per liter).

b. Second Coat:

1) S-W H&C Colortop Water-Based Solid Color Concrete Stain, at 50 to 300 sq. ft. per gal. (1.23 to 7.36 sq. m per liter).

4. Two-Component Epoxy and Epoxy High Build Systems for Non-Traffic Surfaces: Refer to Section 099600 "High-Performance Coatings."

5. Epoxy and Urethane Coatings: Refer to Section 099600 "High-Performance Coatings."

D. Metal Substrates (Aluminum, Steel, Galvanized Steel):

1. Latex System:

a. Prime Coat: Primer, rust-inhibitive, water based:

1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils (0.127 to 0.254 mm) wet, 2.0 to 4.0 mils (0.051 to 0.102 mm) dry.

b. Intermediate Coat: Water-based acrylic, interior, matching topcoat.
c. Topcoat: Water-based acrylic, semi-gloss:

1) S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils (0.064 to 0.102 mm) dry, per coat.

d. Topcoat: Water-based acrylic, gloss:

1) S-W Pro Industrial Acrylic Gloss Coating, B66-660 Series, at 2.5 to 4.0 mils (0.064 to 0.102 mm) dry, per coat.

2. Water-Based Dry-Fall System:

a. Top Coat: Dry-fall latex, flat:

1) S-W Pro Industrial Waterborne Acrylic Dryfall Flat, B42-181 Series, at 6.0 mils (0.152 mm) wet, 1.5 mils (0.038 mm) dry.

b. Top Coat: Dry-fall latex, eggshell:

1) S-W Pro Industrial Waterborne Acrylic DryFall Eg-Shel, B42-82, at 6.0 mils (0.152 mm) wet, 1.9 mils (0.048 mm) dry.

c. Top Coat: Dry-fall latex, semi-gloss:

1) S-W Pro Industrial Waterborne Acrylic DryFall Semi-Gloss, B42-83, at 5.8 mils (0.147 mm) wet, 2.3 mils (0.058 mm) dry.

3. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer, rust-inhibitive, water based:

1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils (0.127 to 0.254 mm) wet, 2.0 to 4.0 mils (0.051 to 0.102 mm) dry.

b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based, eggshell:

1) S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

d. Topcoat: Light industrial coating, interior, water based, semi-gloss:

1) S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

4. Two-Component Epoxy and Epoxy High Build Systems: Refer to Section 099600 "High-Performance Coatings."
5. Waterbased/Alkyd Urethane System:

a. Prime Coat:

1) S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils (0.127 to 0.254 mm) wet, 2.0 to 4.0 mils (0.051 to 0.102 mm) dry.

b. Intermediate Coat: Water-based acrylic-alkyd, interior, matching topcoat.
c. Topcoat: Water-based alkyd-urethane, semi-gloss, interior:

1) S-W Pro Industrial Waterbased Alkyd Urethane Semi-Gloss, B53-1150 Series, at 4.0 mils (0.102 mm) wet, 1.4 mils (0.036 mm) dry, per coat.

d. Topcoat: Water-based alkyd-urethane, gloss, interior:

1) S-W Pro Industrial Waterbased Alkyd Urethane Gloss, B53-1050 Series, at 4.0 mils (0.102 mm) wet, 1.4 mils (0.036 mm) dry, per coat.

E. Wood Substrates: Including exposed wood items not indicated to receive shop-applied finish.

1. Latex System:

a. Prime Coat: Primer sealer, latex, interior:

1) S-W PrepRite ProBlock Primer Sealer, B51-620 Series, at 4.0 mils (0.102 mm) wet, 1.4 mils (0.036 mm) dry.

b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, eggshell:

1) S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils (0.102 mm) wet, 1.7 mils (0.043 mm) dry, per coat.

d. Topcoat: Latex, interior, semi-gloss:

1) S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils (0.102 mm) wet, 1.6 mils (0.041 mm) dry, per coat.

e. Topcoat: Latex, interior, gloss:

1) S-W ProMar 200 Zero VOC Gloss, B21-12650 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

2. Waterbased/Alkyd Urethane System:

a. Prime Coat: Primer sealer, latex, interior:

1) S-W Premium Wall & Wood Primer, B28W8111, at 4.0 mils (0.102 mm) wet, 1.8 mils (0.046 mm) dry.

b. Intermediate Coat: Water-based alkyd-urethane, interior, matching topcoat.
c. Topcoat: Water-based alkyd-urethane, semi-gloss, interior:

1) S-W Pro Industrial Waterbased Alkyd Urethane Semi-Gloss, B53-1150 Series, at 4.0 mils (0.102 mm) wet, 1.4 mils (0.036 mm) dry, per coat.

d. Topcoat: Water-based alkyd-urethane, gloss, interior:

1) S-W Pro Industrial Waterbased Alkyd Urethane Gloss, B53-1050 Series, at 4.0 mils (0.102 mm) wet, 1.4 mils (0.036 mm) dry, per coat.

3. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer sealer, latex, interior:

1) S-W PrepRite ProBlock Primer Sealer, B51-620 Series, at 4.0 mils (0.102 mm) wet, 1.4 mils (0.036 mm) dry.

b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based, eggshell:

1) S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

d. Topcoat: Light industrial coating, interior, water based, semi-gloss:

1) S-W Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

4. Two-Component Epoxy and Epoxy High Build Systems: Refer to Section 099600 "High-Performance Coatings."

F. Wood Substrates, Pedestrian Traffic Surfaces:

1. Latex Floor Enamel System:

a. First Coat: Floor paint, latex, slip-resistant, matching topcoat.
b. Topcoat: Floor paint, latex, slip-resistant, low gloss:

1) S-W ArmorSeal Tread-Plex, B90 Series, at 1.5 to 2.0 mils (0.038 to 0.051 mm) dry per coat.

G. **Gypsum Board** Substrates:

1. Latex System:

a. Prime Coat: Primer, latex, interior:

1) S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils (0.102 mm) wet, 1.0 mils (0.025 mm) dry.

b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: Latex, interior, flat:

1) S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series, at 4.0 mils (0.102 mm) wet, 1.6 mils (0.041 mm) dry, per coat.

d. Topcoat: Latex, interior, low sheen:

1) S-W ProMar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series, at 4.0 mils (0.102 mm) wet, 1.6 mils (0.041 mm) dry, per coat.

e. Topcoat: Latex, interior, eggshell:

1) S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils (0.102 mm) wet, 1.7 mils (0.043 mm) dry, per coat.

f. Topcoat: Latex, interior, semi-gloss:

1) S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils (0.102 mm) wet, 1.6 mils (0.041 mm) dry, per coat.

g. Topcoat: Latex, interior, gloss:

1) S-W ProMar 200 Zero VOC Gloss, B21-12650 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

2. Water-Based Light Industrial Coating System:

a. Prime Coat: Primer sealer, latex, interior:

1) S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils (0.102 mm) wet, 1.0 mils (0.025 mm) dry.

b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
c. Topcoat: Light industrial coating, interior, water based, eggshell:

1) S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K45-151 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

d. Topcoat: Light industrial coating, interior, water based, semi-gloss:

1) S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46-151 Series, at 4.0 mils (0.102 mm) wet, 1.5 mils (0.038 mm) dry, per coat.

3. Two-Component Epoxy and Epoxy High Build Systems for Non-Traffic Surfaces: Refer to Section 099600 "High-Performance Coatings."

END OF SECTION 099123

# SECTION 099300 – STAINING AND TRANSPARENT FINISHING

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes surface preparation and application of wood stains and transparent finishes on the following substrates:

1. Exterior Substrates:

   a. Exposed framing.
   b. Dressed lumber (finish carpentry or woodwork).

2. Interior Substrates:

   a. Exposed framing.
   b. Dressed lumber (finish carpentry or woodwork).
   c. Wood-based panel products.
   d. Wood floors and stairs.

B. Related Requirements:

1. Section 099123 "Interior Painting" for stains and transparent finishes on concrete floors.

### 1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

D. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

E. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

### 1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

C. Samples for Initial Selection: For each type of product.

D. Samples for Verification: For each type of finish system and in each color and gloss of finish required.

1. Submit Samples on representative samples of actual wood substrates, 8 inches square or 8 inches long.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Product List: Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Stains and Transparent Finishes: 5 percent, but not less than of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
b. Other Items: Architect will designate items or areas required.

2. Final approval of stain color selections will be based on mockups.

a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures less than 5 deg F above the dew point, or to damp or wet surfaces.

C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co.
2. Dulux (formerly ICI Paints); a brand of AkzoNobel.
3. Duron, Inc.
4. PPG Architectural Coatings.
5. Sherwin-Williams Company (The).

B. Products: Subject to compliance with requirements, provide product listed in wood finish systems schedules for the product category indicated.

2.2 MATERIALS, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. Stain Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.

C. Maximum Moisture Content of Interior Wood Substrates: 15 percent, when measured with an electronic moisture meter.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with finish application only after unsatisfactory conditions have been corrected.

1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.

1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.

1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.

2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

D. Exterior Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.

2. Prime edges, ends, faces, undersides, and backsides of wood.

a. For solid hide stained wood, stain edges and ends after priming.
b. For varnish-coated stained wood, stain edges and ends and prime with varnish. Prime undersides and backsides with varnish.

3. Countersink steel nails, if used, and fill with putty or plastic wood filler tinted to final color. Sand smooth when dried.

E. Interior Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.

2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.

3. Sand surfaces exposed to view and dust off.

4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dry.

3.3 APPLICATION

A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for finish and substrate indicated.

2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.

3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

A. Wood substrates, nontraffic surfaces, including wood trim, architectural woodwork, doors, windows, and wood-based panel products.

1. **Interior Water-Based over WD-1 (see finish schedule on sheet I110)**:

a. Stain Coat: **natural sealer with whitener**.
b. First Intermediate Coat: **natural sealer matching topcoat.**
c. Second Intermediate Coat: **2000 Water based Polyurethane.**
d. Topcoat: **2000 Water based Polyurethane.**

1) Sheen: **Satin.**

END OF SECTION 099300

# SECTION 101426 – INTERIOR SIGNAGE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Panel signs.
2. Room-identification signs.

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

C. Shop Drawings:

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign.
4. Show locations of electrical service connections.
5. Include diagrams for power, signal, and control wiring.

D. Samples: For each exposed product and for each color and texture specified.

E. Sign Schedule: Use same designations **indicated on Drawing I620 "Signage Floor Plan" in Signage Schedule.**

### 1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

### 1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Executed warranty as indicated below.

### 1.5 WARRANTY

A. The Signage Contractor, by commencing the work of the project, assumes overall responsibility, as a part of his warranty of the work, to assure that all assembled

components and parts shown or required within the work of this project comply with the contract documents. The Signage Contractor shall further warrant:

1. That all components specified, or required, to satisfactorily complete the installation, are compatible with each other and with the conditions of installation and expected use;
2. The overall effective integration and correctness of individual parts and the whole of the system;
3. Compatibility with adjoining substrate, materials and work by other trades;
4. There shall be no premature material failure due to improper design or fabrication of the system. All materials shall fully perform to their normal life expectancy.
5. Upon final completion, the Signage Contractor will warrant all work and materials to be in full and complete accordance with the contract documents and agreement between Owner and Signage Contractor, and requirements appertaining thereto; that all work and materials are free from any and all defects and imperfections, and fully meet the manufacturer's published performance criteria for the use and purposes for which each and every part is specified.
6. The Signage Contractor also agrees that, should any defect develop or appear, which the Graphic Designer and/or Owner finds was not caused by improper use, the Signage Contractor shall promptly, upon demand, fully correct, substitute and make good any such defective material without any cost to the Owner and will save the Owner harmless against any claim, demand, loss or damage by reason of any breach of this warranty.
7. The period of this warranty shall commence on the date on which the Signage Contractor has met all Final Completion requirements. The period of said warranty shall last twelve (12) months unless otherwise specified.

B. All paints used must retain a minimum 10-year warranty for interior signage. This includes no cracking, flaking, and fading.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

A. **Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design sign structure and anchorage for all**

**1. Ceiling Hung Signage**

B. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC/ANSI A117.1 for signs.

### 2.2 SIGNS

A. Acceptable manufacturers: the following is a list of acceptable manufacturers:

1. **Architectural Signing, Katie Beck (770)448-2026 ext. 1430 or Karen Schwartz (678)849-4988.**
2. **Henry Graphics, Shannon Henry (770) 932-3222 or (404) 403-2200**
3. **Option Signs Patti Huxford (770) 569-5871**
4. **Parallax Digital Studios Inc., (770) 654-4006/ (770) 874-8500, x 153**
6. Other manufacturers desiring approval comply with front-end document on alternate approval process prior to Bid.

B. Panel Sign, **as indicated on drawings**: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Solid-Sheet Sign Returns, and Back: Stainless-steel sheet with finish specified in "Surface Finish and Applied Graphics" Subparagraph below and as follows:

   a. Etched, laser cut and/or Filled Graphics: Sign face etched, laser cut or routed. Infills to receive enamel-paint infill-**Black.**

2. Sign-Panel Perimeter: Finish edges smooth.

   a. Edge Condition: Square cut.
   b. Corner Condition in Elevation: Square.

3. Mounting:

   a. Suspended with concealed anchors.
   b. Surface mounted to wall with concealed anchors.

C. Room-Identification Sign, **as indicated on drawings**: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Laminated-Sheet Sign: Aluminum face sheet with raised graphics laminated over a plastic laminate sheet applied to an acrylic backing sheet to produce composite sheet.

   a. Composite-Sheet Thickness: As indicated.
   b. Surface-Applied Graphics: Applied vinyl film.
   c. Cut-out graphics: To view laminate below, as indicated on **Drawings**.
   d. Color(s): As indicated.

2. Sign-Panel Perimeter: Finish edges smooth.

   a. Edge Condition: Square cut.
   b. Corner Condition in Elevation: Square.

3. Mounting: Manufacturer's standard method for substrates indicated, Surface mounted to wall.

   a. Glass mounted as indicated.

b. Gypsum Board surfaces.

C. Overhead Room-Identification Sign, **as indicated on Drawings**: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Fabricated Letters on base plate: Stainless steel fabricated letters as indicated per drawings.

2. Sign-Panel Perimeter: Finish edges smooth.

a. Edge Condition: Square cut.
b. Corner Condition in Elevation: Square.

3. Mounting: Manufacturer's standard method for substrates indicated, Mounted to top of suspended ceiling element.

D. Adhesive backed Sheet Vinyl, **as indicated on Drawings:** Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Mounting: Adhesive backed applied to doors.
a. Center on door or directly above push bar.

2.3 PANEL-SIGN MATERIALS

A. Stainless-Steel Sheet: Type 304, 2B Mill finish, dull.

B. Aluminum sheet- Etched face design to match **Chemetal #914** Cross Hatch Aluminum (submit options for selection and approval).

C. Acrylic Sheet: ASTM D 4802, Type UVF (UV filtering).

D. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated and suitable for exterior applications.

E. Woodwork Fabrication: Strictly comply with AWI standards and approved shop drawings. Provide work matching shapes, profiles and sizes indicated. Scribe work to fit with hair line accuracy. Miter and cope all wood joints and moldings. Securely fasten work to substrates, framing and blocking with concealed fasteners. When face fasteners are unavoidable, countersink fasteners and fill holes flush to be not noticeable after finishing. Conceal all seams in exterior panels with wood trim.

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. Exposed Metal-Fastener Components, General:

    a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.

3. Sign Mounting Fasteners:

    a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
    b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
    c. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.

B. Adhesive: As recommended by sign manufacturer.

C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 1.14 mm thick, with adhesive on both sides.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
2. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
    a. All welding procedures shall conform to applicable AWS specifications.
    b. All welds shall develop capacity of members being joined unless specified length or extent is noted on the drawings.
    c. Type of alloy filler metal and electrodes to be that which is recommended by producer of the metal to be welded, and as required for color match, strength, and compatibility in the fabricated items.
3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
4. Internally brace signs for stability and for securing fasteners.
5. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

B. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into panel surface indicated to produce precisely formed copy, incised to uniform depth.

1. Engraved Metal: Fill engraved graphics with manufacturer's standard baked enamel.
2. Engraved Opaque Acrylic Sheet: Fill engraved graphics with manufacturer's standard enamel.
3. Face-Engraved Clear Acrylic Sheet: Fill engraved copy with manufacturer's standard enamel. Apply manufacturer's standard opaque background color coating to back face of acrylic sheet.
4. Engraved Plastic Laminate: Engrave through exposed face ply of plastic-laminate sheet to expose contrasting core ply.

C. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.

D. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.

E. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish as specified color unless otherwise indicated.
2. Stainless-Steel Brackets: Factory finish brackets with No. 4 finish unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.

b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

   a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
   b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

3. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
4. Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.
5. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
6. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

C. Remove temporary protective coverings and strippable films as signs are installed.

END OF SECTION 101426

# SECTION 102600 – WALL PROTECTION

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Corner guards.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
2. Include fire ratings of units recessed in fire-rated walls.

B. Sustainable Design Submittals:
1. Product Data: For adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For each type of wall protection showing locations and extent.
1. Include plans, elevations, sections, and attachment details.

D. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.
1. Include Samples of accent strips and accessories to verify color selection.
2. Corner Guards: 12 inches long. Include example top caps.

### 1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of handrail.

B. Material Certificates: For each type of exposed plastic material.

C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of wall protection product to include in maintenance manuals.
   1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of cover installed, but no fewer than two, 48-inch- long units.
   2. Mounting and Accessory Components: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store wall protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
   1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
   2. Keep plastic materials out of direct sunlight.
   3. Store plastic wall-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
      a. Store corner-guard covers in a vertical position.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of wall-protection units that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
      b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain wall-protection products from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for buildings and Facilities and ICC A117.1.

2.3 CORNER GUARDS

A. Surface-Mounted, Metal Corner Guards: Fabricated as one piece from formed or extruded metal with formed edges.
   1. Basis-of-Design: Subject to compliance with requirements, provide X-Reveal by Fry Reglet, or a comparable product as approved by the Architect.
   2. Material: Aluminum, extruded alloy 6063T5.
      b. Finish: as noted on drawings.
   3. Height: full height of wall/partition, unless otherwise indicated.

2.4 MATERIALS

A. Stainless Steel: Type 304; 16 gauge.
B. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
C. Adhesive: As recommended by protection product manufacturer.
   1. Adhesives shall have a VOC content of 70 g/L or less.
   2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 FABRICATION

A. Fabricate wall protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.6 FINISHES

A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Examine walls to which wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
    1. For wall protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing wall protection.
B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Installation Quality: Install wall protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
B. Mounting Heights: Install wall protection in locations and at mounting heights indicated on Drawings.
C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
    1. Provide anchoring devices and suitable locations to withstand imposed loads.
    2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches apart.
    3. Adjust caps as required to ensure tight seams.

3.4 CLEANING

A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.
B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600

# SECTION 102800 – TOILET AND CUSTODIAL ACCESSORIES

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Custodial accessories.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Features that will be included for Project.
5. Manufacturer's warranty.

C. Samples: Full size, for each accessory item to verify design, operation, and finish requirements.

1. Approved full-size Samples will be returned and may be used in the Work.

D. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify products using designations indicated.

### 1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

### 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.7 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.

B. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

C. Install blocking (wood or metal strap) required to support toilet accessories at all accessories.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Bradley Corporation.
4. Approved equal prior to bid.

**B. BC - Baby Changing Station**
**1. Basis-of-Design Product: Bobrick KOALA KARE KB310-SSWM**
**2. Material and Finish: Horizontal, recessed mounted baby changing station, stainless steel finish**

**C. GB - Grab Bar: Two-wall Grab Bar**
**1. Basis-of-Design Product: 42" x 54", 1 ¼" diameter; Bobrick #B-5897.**
**2. Material and Finish: Stainless steel with peened gripping, No. 4 finish (satin brushed).**

**D. HD – Hand Dryer**
1. **Basis-of-Design Product: Dyson, V-Blade Hand Dryer. AB12-N-LV.**
2. **Material and Finish: Manufacturer's standard finish – Sprayed Nickel.**

**E. M - Mirror**
1. **Product: as indicated on Drawing A230.**
2. **Material and Finish: 24" X 36" Arched framed mirror. Premium metal and mirrored glass construction. CPL Polished Chrome with corrosion and tarnishing resisting frame finish. Caulk joints between bottoms of mirrors and tops of backsplashes and side splashes at vanities with clear, mildew-resistant silicone sealant.**

**F. MH - Mop Holder**
1. **Basis-of-Design Product: Bobrick B-223 x 24**
2. **Material and Finish: satin-finish stainless steel.**

**G. RH - Robe Hook**
1. **Basis-of-Design Product: Bobrick B-76717**
2. **Material and Finish: satin brushed stainless steel.**

**H. SP - Soap Dispenser**
1. **Basis-of-Design Product: Bobrick B-2013 automatic wall mounted foam soap dispenser.**
2. **Material and Finish: Stainless steel, No. 4 finish (satin brushed)**

**I. T - Trash Receptacle**
1. **Basis-of-Design Product: Bobrick #B-2260**
   a. **Free standing waste receptacle, no swing top,**
2. **Material and Finish: Stainless steel, No. 4 finish (satin brushed).**

**J. TC - Trash Chute**
1. **Basis-of-Design Product: Bobrick #B-532 circular waste chute.**
2. **Material and Finish: Stainless steel, No. 4 finish (satin brushed).**

**K. TP - Toilet Paper Dispenser**
1. **Basis-of-Design Product: Bobrick #B-4288, Surface mount.**
2. **Material and Finish: Stainless steel, No. 4 finish (satin brushed).**

**L. TS - Toilet Seat Cover Dispenser**
1. **Basis-of-Design Product: Bobrick #B-4221, Surface mount.**
2. **Material and Finish: Stainless steel, No. 4 finish (satin brushed).**

## 2.3 UNDERLAVATORY GUARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Plumberex Specialty Products, Inc.
2. Truebro by IPS Corporation.

B. Underlavatory Guard:

1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
2. Material and Finish: Antimicrobial, molded plastic, white.

2.4 CUSTODIAL ACCESSORIES

**A. US - Utility Shelf:**

**1. Basis-of-Design Product: Surface mounted, American Specialties – 0692-618**
**2. Material and Finish: Stainless steel, No. 4 finish (satin).**

2.5 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N) typical, when tested according to ASTM F 446.

C. Install blocking required to support all toilet accessories

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

# SECTION 104413 - FIRE PROTECTION CABINETS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes fire-protection cabinets for portable fire extinguishers.

**B. Fire extinguishers shall be of the types and sizes required by NFPA 10 and the local authority having jurisdiction. The fire extinguishers must be UL listed with a UL listing mark for type, rating and classification of each extinguisher.**

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fire-protection cabinets.

### 1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

### 1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

### 1.5 SEQUENCING

A. Apply vinyl pictorial label on fire-protection cabinets after painting is complete.

### **1.6 WARRANTY**

**A. Extinguishers shall have manufacturer's standard form warranty in which manufacturer agrees to repair or replace fire extinguishers that fail in materials and workmanship within a specified warranty period of six years. Failures include, but are not limited to, the following: failure of hydrostatic tests according to NFPA 10 and faulty operation of valves or release levers.**

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed. **Cabinets and placement of cabinets shall conform to requirements of the Americans with Disabilities Act as to maximum projection into corridors and height from finished floor.**

2.2 FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. **JL Industries, Inc.; a division of the Activar Construction Products Group.**
   b. Approved equal prior to bid.

B. Cabinet with Stainless Steel Trim and Door: **Cosmopolitan Series, Model**
1. Cabinet Style: **Semi-Recessed or Surface Mounted as indicated on life safety plans G200. Steel Powder-coated finish, color to match adjacent wall. Solid door with pull. Refer to drawing G200 for specific instructions.**
   **Basis of Design: JL Industries Ambassador Series 1016S21.**
2. Components:
   a. Tub: Cold-rolled steel.
      1) Finish: Factory-applied **powder coat paint finish**. Field painting is NOT acceptable.
         a) Standard Color: **Match adjacent wall**
   b. Door and Trim Construction: **Powder coated steel**; flush doors with **5/8"** door stop attached by continuous hinge and equipped with zinc-plated handle with roller catch.
      1) Finish: Factory-applied powder coat paint finish.
         a) Standard Color: **Match adjacent wall**
         b) **Apply a silver metallic fire extinguisher pictorial label to the outside of door in location and size as indicated on drawing 2/G200.**
   c. Trim Style and Depth:
      1) Recessed Cabinet: **5/8"** flat trim.

2.3 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare recesses for semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.

B. Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

D. Identification: Apply vinyl lettering at locations indicated.

E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION 104413

# SECTION 104416 - FIRE EXTINGUISHERS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes portable, fire extinguishers and mounting brackets for fire extinguishers in locations indicated on floor plans.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

### 1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

### 1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

### 1.6 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed, and labeled by FMG.

### 1.7 COORDINATION

A. Coordinate type, capacity, labeling and location of fire extinguishers with the local Fire Marshall to ensure fit and function.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.
1. Manufacturers: Subject to compliance with requirements, provide products, approved by the authority having jurisdiction, by one of the following:

a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
b. Larsen's Manufacturing Company.
c. Approved equal prior to bid.

2. Valves: Nickel-plated, polished brass body.
3. Handles and Levers: Stainless steel.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

**FEC 1 (non-water – typical applications): Provide UL rated 2A, 10BC extinguisher. Field verify locations (coordinate with local Fire Officials).**

**Extinguisher NO. LARSEN MP10, 10# WITH 4A; 60 B:C DRY CHEMICAL EXTINGUISHER. NO HALON PRODUCTS PERMITTED.**

2.2 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers specified, or required by authority having jurisdiction, with plated finish.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
b. Larsen's Manufacturing Company.
c. Approved equal prior to bid.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

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

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations compliant with requirements of authorities having jurisdiction.

1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

C. Sealant: Sealant at perimeter, typical surround sealant color to match adjacent wall.

D. Cabinets: Provide semi-recessed cabinets

END OF SECTION 104416

# SECTION 105501 – LIBRARY BOOK DEPOSITORY

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Library book drop

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, and attachment details.

C. Samples: For each type of exposed finish.

### 1.3 DELIVERY, STORAGE, AND HANDLING

A. Furnish lock keys with temporary identification for their respective locks, bagged, and securely taped inside the collection compartment for shipping.

### 1.4 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of postal specialties that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 BOOK DEPOSITORY

B. **Exterior Drive Up (Refer to Drawings for locations)**

1. Basis-of-Design Product: Subject to compliance with requirements, provide **Kingsley Companies; Kingsley # 00-9850 Outdoor Depositories**.

2. Or a comparable product by one of the following:

a. American Book Returns.

2.2 FABRICATION

A. Form book depository to required shapes and sizes, with true lines and angles, square, rigid, and without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges and corners free of sharp edges and burrs and safe to touch. Fabricate doors of postal specialties to preclude binding, warping, or misalignment.

B. Preassemble book depository in shop to greatest extent possible to minimize field assembly.

C. Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturers of dissimilar metals.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Book depository: Install book depository as per manufacturers instruction. Coordinate location and door height with drawings.

END OF SECTION 105501

KINGSLEY
LIBRARY EQUIPMENT

# Outdoor Depositories

## Product: 50 C-Series

## Catalog#: 00-9850

Specifications are subject to change without notice. Please see **www.kingsley.com** for the most current specifications. **Made in the USA.**

## Curbside Return Construction/Features

| | |
|---|---|
| **Materials:** | All component parts: 12 gauge aircraft grade aluminum for high strength and excellent dent resistance. |
| **Versatility:** | Easy 360 degree hood rotation for your convenience. |
| **Weather Resistance:** | Fully sealed to prevent leaking in adverse weather conditions such as rain, ice, snow, and dust. Full ramped bottom is sloped to shed water from inside the depository. Sloped and radius hood helps shed water. Built-in door drip rail comes standard and helps deter water from entering at top of cart door. |
| **Theft Deterrence:** | Exclusive Kingsley theft deterrent chute design. Full-length stainless steel hinge on access door. No corner seams to pull apart. |
| **Fire Suppression:** | Airtight design smothers most fires in less than 1 minute. |
| **Available Finishes:** | See website for available color options. |
| **Available Wording:** | See website for available graphics options. |
| **Locking Method:** | • Depository Opening: (2) keyed cam locks.<br>• Cart Access Door: 3-point locking (top, bottom, and opening side). Keyed paddle lock with weather sealed lock cover to prevent freezing and keep dirt out. |
| **Liquid Drainage System:** | Designed to divert liquid from the depository opening away from the collection area. |
| **ADA Compliancy:** | ADA compliant when properly installed. |
| **Assembly Required:** | Ships fully assembled. |

KINGSLEY
LIBRARY EQUIPMENT

## Curbside Return Measurements

| | |
|---|---|
| **Overall Dimensions:** | 30” W x 42-15/16” D x 53-5/8” H<br>[762 mm W x 1090.61 mm D x 1362.07 mm H]<br>**Footprint of cabinet is 30” square. Hood is 42-$^{5}/_{16}$” D.** |
| **Depository Opening:** | 17-$^{7}/_{8}$” W x 3-$^{1}/_{2}$” H<br>[454 mm W x 88.9 mm H] |
| **Product Weight:** | 85 lbs. [38.56 kg] |
| **Shipping Method/Class:** | Freight/class 150 |

### Transport Carts Used with This System:

**#30-9050** – Duralight EasyRoller Cart
**#30-9650** – Duralight EasyRoller SafeGuard Cart
**#37-9050** – Duralight EasyRoller CushionDrop Cart
**#30-9150** – Duralight 50 Series EV Cart

Please note: Cart capacities vary. See cart specifications for more information.

### Accessories/Options for This System:

**Braille Tags** – Reads: BOOK DROP (**#99-8100**) or VIDEO DROP (**#99-8105**)
**MagnaClose Kit** – **#09-9800**
**Insulation Kit** – **#09-0150**
**Custom Wording/Graphics** – Contact us for a quote.
**Custom Finish** – Contact us for a quote.

# SECTION 113101– APPLIANCES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Refrigeration appliances.

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

### 1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Field quality-control reports.

C. Sample warranties.

### 1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

### 1.5 QUALITY ASSURANCE

A. Gas-Fuel Conversion: Provide gas-fueled appliances with manufacturer's high-altitude and propane conversion kit installed by a qualified service agency according to manufacturer's written instructions for Project location and type of fuel.

### 1.6 WARRANTY

A. Special Warranties: Manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Gas-Fueled Appliances: Certified by a qualified testing agency for each type of gas-fueled appliance according to ANSI Z21 Series standards.

2.2 APPLIANCES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. General Electric Company (GE Appliances) (Basis of Design).
2. Amana; a division of Whirlpool Corporation.
3. Electrolux Home Products (Frigidaire).
4. Sears Brands LLC (Kenmore).
5. Whirlpool Corporation.

B. **Equipment schedule: refer to drawings.**

PART 3 - EXECUTION

3.1 INSTALLATION

A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After installation, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.

B. An appliance will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 113101

# SECTION 124920- SOLAR SHADES

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. Solar Shades

### 1.2 SUBMITTALS

A. Product data: Manufacturer's complete CSI 3- part specification sheet.
B. Samples:
   1. Submit working hand sample or mock up shade as required.
   2. Submit two 6" samples of shade fabric.

### 1.3 DELIVERY, STORAGE AND HANDLING

A. Product to be delivered in manufacturer's original packaging.
B. Products to be handled and stored to prevent damage to materials, finishes and operating mechanisms. Store in a clean, dry area, laid flat to prevent sagging and twisting of packaging.

## PART 2 PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

A. **Mecho Systems, Inc.** or architect approved equivalent.
B. Substitutions Request: Submit for approval under provisions of section 01600.

### 2.2 CELLULAR SHADES

A. Product: Mecho Systems, Inc. Mecho/5 manual shade system

B. **Solar Shade Fabric: Select from NFPA 701-1999 FR and ASTM-G21 and G22 Bacteria and Fungal Resistance approved:**
   **1. Shades**
      **a. Fabric Style: Refer to finish legend on Drawing I110.**
      **b. Color Name: Refer to finish legend on Drawing I110.**
      **c. Location: As indicated on the drawings.**
      **d. Housing color: Refer to finish legend on Drawing I110.**

C. Roller Tubes: Shall be an extruded aluminum tube with a wall thickness of .050", incorporating two internal locking channels running the length of the tube for added strength and durability. Shade material will be attached to the tube by placing fabric end into internal locking channel and inserting a vinyl strip the length of the tube, locking fabric into place.

D. Clutch Systems: Shall be a wrap spring design with high strength acetal and glass filled nylon components. Spring shall be stainless steel and will raise and lower the shade by means of a continuous #10 stainless steel bead chain.

E. Clutch Operation will be by means of a continuous #10 Stainless Steel bean chain providing a positive lifting and lowering of the shade.

F. Idle End is made of nylon with a spring-loaded center pin for smooth and quiet operation.

G. Roll Orientation: Standard will be fabric coming from backside of tube closest to the window.

Optional:

Reverse roll will have fabric coming over the roller tube (not available with fascia),

H. Bottom Hem Bar will be extruded aluminum measuring 1.2" high by .58" deep with a .050" wall thickness. The room facing side of the hem bar will be fabric wrapped with the fabric secured by a vinyl locking strip insert at the top and bottom of the bar. The backside of the bar will be either white, anodized silver or bronze with color coordinated injection molded thermoplastic end plugs.

I. Installation brackets without fascia shall be .060" thick and available in white or black and shall facilitate side, rear and top mounting applications. For shades with fascia option, brackets shall measure .065" thick and color coordinated to match fascia.

J. Options:

1. Fascia will be extruded aluminum measuring .075" thick, snap in locking system and will enclose the roller tube and mounting brackets.
   a. Color: **to match adjacent windows as indicated on drawings.**

2. Side Channels will be extruded aluminum measuring 1.25" by 2.06" with a wall thickness of .060". Side channels will include a mole hair weather stripping insert.
   a. Color: **to match adjacent windows as indicated on drawings.**

3. Sill Channels will be extruded aluminum measuring 1.25" by 2.06" with a wall thickness of .060". Sill channels will include a mole hair weather s tripping insert
   a. Color: **to match adjacent windows as indicated on drawings.**

2.3.1 FABRICATION

A. Shades shall be fabricated according to specifications and accurate to tolerance established by SWF engineering standards**. Divide shades at center of window mullions. Refer to drawings. Field measure.**

PART 3 EXECUTION

3.01 INSPECTION

A. Installer shall be responsible for inspection of jobsite, approval of mounting surfaces, verification of field measurements and installation conditions. Installation shall commence when satisfactory conditions are met.

3.02 INSTALLATION

A. Install shades in accordance with manufacturer's instructions including recommended support brackets and fasteners.

B. Install shades with adequate clearance to permit smooth operation of the blinds. Demonstrate blinds to be in smooth, uniform working order.

3.03 MAINTENANCE AND CLEANING

A. Maintain and clean shades in accordance with manufacturer's instructions.

END OF SECTION 124920

SECTION 125651 – LIBRARY FURNITURE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes loose furnishings and equipment to be supplied and installed under **a separate construction package with the exception of items 2.1.B and C.**

1.2 GENERAL REQUIRMENTS

A. **The Contractor is responsible for coordinating with the work listed in the Summary for this Contract.** The Contractor is advised to take all of the provisions herein into consideration when preparing his bid and all costs associated with performing work resulting from all sections. The Contract Documents shall be construed so as to require the Contractor to perform all work reasonably inferable there from as being necessary in order to produce the indicated operational or finished result.

B. The Supplier shall assign one (1) project manager to oversee the entire contract through to the satisfactory installation of the specified furniture. This person will be the coordinator for the Supplier and the Designated Owner's Representative's liaison with the Supplier. It is the responsibility of this project manager to conform to the items and instructions outlined in these Documents.

1. Supplier/Project Manager shall be capable of providing full planning, procurement and installation services for all specified furniture included within this section.
2. Supplier/Project Manager shall have a local showroom/warehouse within 50 miles of the Project site.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PROJECT

A. **Furniture (State Contract). Drawing I420 Yellow Items.**
**All furniture under State Contract as depicted in the construction drawings is NOT in the Contractor's bid. The Contractor is to coordinate installation and delivery of all items.**

B. **Shelving (State Contract). Drawing I420 Blue Items.**
**All Shelving under State Contract as depicted in the construction drawings is NOT in the Contractor's bid. The Contractor is to coordinate installation and delivery of all items.**
**The architect's preferred vendor for all shelving is the following:**

1. **Source Interiors**

C. **Millwork.** **Drawing I420 Green Items.**
**All work as depicted in the construction drawings is to be INCLUDED in the Contractor's bid. Built in Millwork may be provided by separate millwork provider. The architect's preferred vendors for all millwork is the following:**

1. **Custom Cabinet Mill of Georgia**
   **425 Gennett Dr**
   **Jasper, GA 30143**
   **Roert Chappell**
   **O (678) 523-6790**
   **E Robert@ccmofgeorgia.com**
   **Lee Glasser**
   **Estimator**
   **C (404) 915-7045**
   **E davidg@ccmofgeorgia.com**
   **E estimating@ccmofgeorgia.com**

2. **Atlanta Casework Systems**
   **www.atlcasework.com**
   **3815 Evans Road**
   **Cumming, Ga. 30040**
   **Marty Hammond**
   **O. (770) 887-4766**

3. **Mortensen Woodwork, Inc.**
   **4920 Baker Street**
   **Union City, Georgia 30291**
   **O (770) 969-1475**
   **E jmcclamroch@mortensenwoodwork.com**

**The Contractor will be responsible for ordering and coordinating delivery. Installation will be by the manufacturer and coordinated by the Contractor. All items depicted in the construction drawings is to be in the Contractor's bid. Architect will review shop drawings.**

D. **Demountable glass walls (and doors and adjacent glass system listed as such in the door schedule) is to be supplied and installed by glass walls provider that can provide the specified door type and dimensions.**
**All work as depicted in the construction drawings is to be INCLUDED in the Contractor's bid. Approved providers includes, but not limited to:**

a. **Steelcase Everwall, Privacy Wall, or V.I.A. (Basis of Design)**
b. **Allsteel Aspect by Office Creations**

PART 3 - EXECUTION

3.1 LOCATIONS AND QUANTITIES

A. Refer to Drawings for furniture locations and quantities.

END OF SECTION 125651

# SECTION 220100 - GENERAL PLUMBING REQUIREMENTS

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Provide the necessary interface with other Divisions to provide a complete project. Carefully check the Documents of this Division with those Documents of other Divisions. Determine the requirements of any interfacing materials or equipment being furnished and/or installed by those Sections and Divisions and provide proper installation and required interface.

B. No deviation from the Contract Documents shall be made without the written consent of the Architect and Engineer.

C. All Specifications and Drawings are to be considered together as the Contract Documents. Any work shown in one and not the other, or is implied by either, shall be provided to make a complete project. Should conflicts exist between the Specifications and Drawings or there is an item shown or noted for which is not clearly defined, immediately submit a request for clarification. Under no circumstance will conflicts between the Specifications and Drawings be grounds for additional cost to the Contract after the Contract is established.

D. The Drawings are schematic and are not intended to show the exact location of piping, equipment, etc.

E. Dimensions and information regarding accurate locations of equipment, and structural limitations and finish shall be coordinated and verified with other Divisions of Work. Be prepared to furnish dimensions and information regarding the Work of this Division to other trades. Coordination with other Divisions shall be demonstrated on the shop drawings.

F. The right is reserved to relocate any device (receptacle, switch, fire alarm, audio/visual, junction box, outlet, etc.) a maximum of 10'-0" before it is permanently installed without incurring additional cost to the Contract.

### 1.02 REFERENCE STANDARDS

A. All work shall comply with the most recently revised versions of all local, state and federal codes, ordinances of the authority having jurisdiction, laws, rules and regulations. Any modifications required by any of the above shall be made without any additional cost to the Owner. Where requirements between governing Codes and Regulations vary, the more restrictive provision shall apply.

B. Nothing contained in the Contract Documents shall be construed as authority or permission to disregard legal requirements and regulations. The Contractor shall thoroughly review the Documents and bring any such conflicts to the attention of the Architect and Engineer prior to Installation.

C. All materials, installation, and workmanship shall comply standards and/or codes of the following:
   1. International Building Code – 2018 edition, with latest Georgia amendments
   2. International Mechanical Code - 2018 edition, with latest Georgia amendments
   3. International Plumbing Code - 2018 edition, with latest Georgia amendments
   4. International Fuel Gas Code - 2018 edition, with latest Georgia amendments
   5. International Fire Code - 2018 edition, with latest Georgia amendments
   6. International Energy Conservation Code - 2015 edition, with latest Georgia amendments
   7. National Electrical Code, 2020 Edition
   8. National Fire Protection Association
   9. State of Georgia (ANSI 117.1) Handicap Code
   10. ANSI - American National Standards Institute
   11. ASTM - American Society of Testing and Materials
   12. NEMA - National Electrical Manufacturer's Association
   13. OSHA - Occupational Safety and Health Act
   14. UL - Underwriter's Laboratories
   15. ASHRAE - American Society of Heating and Air Conditioning Engineers
   16. SMACNA - Sheet Metal and Air Conditioning Contractors' Nat'l Assoc.

D. All materials shall be new and shall bear the label of UL.

1.03 EXISTING CONDITIONS

A. Where work is to be performed in an existing facility, the contractor shall visit the site prior to bid and be familiar with all existing conditions. Special attention shall be given to work to be performed above an existing ceiling.

B. Where existing slabs are to be cut or core drilled, the contractor shall x-ray the existing slabs to avoid cutting or disrupting existing conduits, cables, plumbing or structural members.

C. HVAC systems, plumbing systems, and electrical service to the building shall not be interrupted without written consent of the building owner.

D. No allowance will be made for lack of knowledge of existing conditions.

E. At the completion of the project, all work under this Division shall be completely integrated with the existing systems and left in perfect operating condition.

F. Where work under this Division disrupts the continuity of any existing to remain electrical circuit or feeder, the Contractor shall repair/replace as necessary to return to a perfectly functional and safe operating condition.

G. Prior to any demolition or construction, the Contractor shall have the existing conditions inspected by an EPA, OSHA certified asbestos abatement agency to identify the presence of asbestos. Should any asbestos be found it shall be brought to the immediate attention of the Architect and Owner and specifically identified in writing.

1.04 DEFINITIONS

A. Provide: to furnish, install and connect.

B. Furnish: to supply all materials, labor, equipment, testing apparatus, controls, tests, accessories and all other items customarily required for the proper and complete application.

C. Install: to join, unite, fasten, link, attach, set-up or connect together, complete, tested, and ready for normal satisfactory operation.

D. Engineer: The Engineer of record.

E. Contract Documents: the complete set of Specifications and Drawings of all Divisions.

F. Work: labor, materials, equipment, accessories, controls and other items required for a complete installation.

G. Concealed: embedded in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces or in enclosures.

H. Exposed: not installed underground or concealed.

I. Equal: equal in quality, workmanship, materials, weight, size, design and efficiency of the specified product, conforming with manufacturers.

J. Supply: to purchase, procure, acquire and deliver complete with related accessories.

K. Authority Having Jurisdiction (AHJ): applicable local, state and federal authorities having jurisdiction over any part of the Scope within this Division and other Divisions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer's names and catalog numbers specified in the Contract Documents are intended to describe the material and set the standard of quality. All bids shall be based on material specified. Request for approval of material not specified shall be considered if the request is in written form and submitted to the Architect no later than fourteen (14) days prior to the bid date. All requests shall conform to the provisions of the general and supplementary conditions.

B. When specific names are not stated, only the best available quality of material or equipment shall be submitted for review and used in the installation.

2.02 BASIS OF DESIGN

A. Where a product is designated as "BASIS OF DESIGN", the Contractor is notified that mechanical, electrical, structural, architectural, space conditions and/or other features of the overall project design have been based on the requirements of the "BASIS OF DESIGN" product.

B. Where a product is substituted for a "BASIS OF DESIGN" product, the Contractor is notified that changes in project design may be mandatory in order to permit use and installation of the substitute product. Shop drawing submittal for a substitute product shall include a complete schedule of changes in project design, if any, which must be made in order to permit use and installation of the substitute product. The Contractor shall bear all expenses related to the use of a substitute product.

2.03 SHOP DRAWINGS AND PRODUCT DATA

A. The Contractor shall obtain complete shop drawings, product data and samples from the manufacturers, suppliers, vendors, and all Division 22 Subcontractors, for all materials and equipment as specified herein in various Sections of the Specifications, and shall submit data and details of such materials and equipment for review by the Architect and Engineer. Prior to submission of the shop drawings, product data and samples to the Architect and Engineer, the Contractor shall thoroughly review the shop drawings, product data and samples and certify they are in compliance with the Contract Drawings. Further, the Contractor shall check all materials and equipment upon their arrival on the Project site and verify their condition and compliance with the Contract Documents. Any Work which proceeds prior to receiving reviewed shop drawings shall be modified as required to comply with the Contract Documents and the shop drawings. A minimum period of ten (10) working days, exclusive of transmittal time, will be required in the Engineer's office each time a shop drawing, product data and/or sample is submitted or resubmitted for review. This time period shall be considered by the Contractor when scheduling his Work. The initial shop drawing review for equipment and materials may be expedited through the mutual consent of the Contractor, Architect, Engineer, and Owner providing the Contractor agrees to submit complete, certified, documented, and coordinated shop drawings for review in accordance with the requirements of the Contract Documents.

B. The review of shop drawings, product data, and samples by the Architect and Engineer shall not relieve the Contractor of the responsibility for dimensions or errors that may be contained therein, or for deviations from requirements in the Contract Documents. It shall be clearly understood that the noting of some errors by the Engineer but overlooking others does not grant the Contractor permission to proceed in error.

C. All shop drawings and product data/submittals shall be submitted in compliance with the requirements of the general and supplementary conditions. No more than four (4) copies of submittal data will be reviewed. Any additional copies will be returned unmarked. The responsibility of copying review comments on any additional copies will rest solely with the Contractor.

D. All product data/submittals shall bear the name of the manufacturer to be used.

E. All shop drawings and submittals shall include a stamped indication signifying that the submittal has been reviewed for compliance with the Contract Documents by the Contractor. This stamped indication also represents the fact that the Contractor has checked this submittal for its interaction with all other Divisions and certifies by his signature or initials that all coordination has taken place. The stamp shall include the date, name of the Contracting Firm, the signature of the Contractor, certification of compliance and approval. This stamp shall be on the submittal before the Engineer will review it.

F. The Engineer will review an individual submittal not more than twice. If the submittal is rejected again on the second review, the Contractor will bare all responsibility for paying for the Engineer's time for additional reviews. Such payments to the Engineer shall be withheld from the next monthly pay application.

G. Shop drawings and/or product data shall be submitted for the following for review:

1. Plumbing piping system layouts. These drawings must include associated equipment, drawn to scale based on submittals for that equipment, must be dimensioned, and must include piping and equipment elevation tags (distance above finished floor to bottom).
   The Contractor is encouraged to develop their own shop drawings, without having had the Engineer's CAD files (as previously stated, the Engineer's drawings are schematic/diagrammatic in nature). Should the Contractor insist on using the Engineer's CAD files in the procurement of shop drawings, the Contractor must pay the Engineer $150.00 per sheet for the CAD files.
   The Contractor shall give the Engineer a written release, acceptable to the Engineer, signed by a corporate officer of the Contractor. This release shall also include a copyright statement indicating that these drawings or electronic data contained will not be used on any other project. The release and payment for the files must be received PRIOR to delivery of the CAD files.
2. Equipment, including but not limited to water heaters, plumbing fixtures, booster systems, lift stations, heat tracing, insulation, piping specialties, etc.

2.04 AS-BUILT DRAWINGS

A. The Contractor shall maintain on a daily basis at the Project site a complete set of "Record Drawings". The "Record Drawings" shall consist of a set of black-line or blue-line prints or AutoCAD files of the Contractor Coordination Drawings for this Division. The prints shall be marked, or the AutoCAD file electronically updated to show the precise location of all work and equipment, and all changes and deviations in the work from that shown on the Contract Documents. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or work without definite instructions from the Architect or Engineer. The continuously updated coordination drawings (shop drawings previously described) shall be used to produce the final "Record Drawings" which shall be delivered to the Owner in AutoCAD electronic format (CD) upon Project completion.

B. Record dimensions shall clearly and accurately delineate the work as installed; locations shall be suitably identified by at least two dimensions to permanent structures.

C. The Contractor and Subcontractor shall mark all "Record Drawings" on the drawings with a rubber stamp impression or an AutoCAD image that states such.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The equipment selections used in the preparation of the Contract Documents will fit into the physical spaces provided and indicated, allowing ample room for access, servicing, removal and replacement of parts, etc. Adequate space shall be allowed for clearance in accordance with the Code requirements and the requirements of the local Authorities having jurisdiction, and the equipment manufacturer 's recommendations.

B. In the preparation of Drawings, a reasonable effort to accommodate acceptable equipment manufacturer's space requirements has been made. However, since space requirements and equipment arrangement vary according to each manufacturer, the responsibility for initial access, maintenance access, code required access, and proper fit rests with the Contractor.

C. Physical dimensions and arrangements of equipment to be installed shall be subject to the Architect's and Engineer's review.

D. The General Contractor and all Subcontractors shall coordinate the installation of ductwork, conduit, busway, piping, cable trays, etc., installation with lighting fixtures, special ceiling construction, air distribution equipment, and the structure. Provide additional rises, drops and offsets as required. If after installed, new ductwork, conduit, busway, piping or cable is found to be in conflict with the architecture, structure, or other

trade Work which is either existing or shown on the Contract Documents, the ductwork, conduit, busway, piping or cable shall be relocated without additional cost to the Owner.

E. No piping, equipment, etc., shall be installed in the eight (8) inch high zone directly above the ceiling in tenant areas to allow for tenant build-out and flexibility unless otherwise specifically shown on the Drawings or prior written authorization is received from the Engineer.

F. Accessibility and Clearance:
   1. Piping, etc. shall be installed in accessible locations, avoiding obstructions, preserving headroom, and keeping openings and passageways clear.
   2. Minor adjustments in the locations of equipment shall be made where necessary, providing such adjustments do not adversely affect functioning of the equipment.

G. Scaffolds and staging for installation of plumbing work shall be provided under the work of this Division.

3.02 STRUCTURAL FITTINGS

A. Furnish and install the necessary sleeves, inserts, hangers, anchor bolts, and related structural items. Install at the proper time.

B. Openings may have been indicated on the Architectural and Structural drawings. Should any additional openings or holes be required, the same shall be provided at no additional cost to the Owner.

C. Location: At a time in advance of the work, verify openings shown on the Architectural and Structural drawings, and coordinate any additional openings.

D. If the work of this Section requires modification of the Architectural or Structural drawings, furnish new instructions as to requirements for these openings. Submit for review and coordination to Architect.

E. Sleeves shall be supplied for mechanical piping passing through walls or slabs and shall be placed before concrete is poured.

F. Equipment supports for mechanical work shall be fastened to the structure by inserts, anchor bolts, bolting to drilled and tapped structural members, or be welded to the structure.
   1. Welding shall be done by the electric arc method with fully competent welders. Supporting members shall be shop coated with a suitable primer.
   2. Surfaces damaged by installation of supports shall be touched up with primer to match shop coat. Any drilling of structural members shall be approved by the Architect.

G. Flashing:
   1. Wherever piping passes through the roof or outer walls, base flashing and counterflashing shall be provided.

2. Such flashing shall be properly installed by skilled workmen, and shall include grouting, mastic or tar application, or other means to insure a permanent, waterproof, neat and workmanlike installation.
3. Insofar as possible, flashing shall comply with and be similar to requirements for flashing in General Construction Work.

H. Anchor bolts and inserts shall be galvanized and of adequate size and strength for installation of electrical work and shall be placed in forms before concrete is poured.
1. Placement of bolts in bases shall be done under other Division. Furnish detail drawings, templates, and anchor bolts for bases to the General Contractor in time to avoid delaying work schedules.
2. Expansion shields shall only be used with specific approval of the Architect. Wooden or soft metal plugs shall not be used.

I. Cutting and patching:
1. All additional cutting, patching and reinforcement of construction of building, subject to review by the Architect, shall be performed under this Section.
2. Refer to appropriate Division for requirements.

3.03 WEATHERPROOF EQUIPMENT

A. Plumbing devices or equipment located in damp; semi-exposed areas shall be weather-resistant. Enclosures shall comply with NEMA Type 3R requirements.

B. Air distribution devices located in damp areas outside shall be weather-resistant (aluminum, etc.).

3.04 CLEANING

A. Brush and clean work prior to concealing, painting and acceptance. Perform in stages if directed.

B. Painted exposed work soiled or damaged: Clean and repair to match adjoining work before final acceptance.

C. Remove dust and debris from inside and outside of material and equipment.

3.05 TESTS AND DEMONSTRATIONS

A. All systems shall be tested in the presence of the Owner or an Owner designated representative upon completion of the Work and demonstrates that the installation is in accordance with the Contract Documents.

B. All motors shall be checked and adjusted for correct direction of rotation.

C. Any work found not to be in compliance with the Contract documents shall be repaired or replaced without incurring additional cost to the Contract price.

D. Provide all instruction to the Owner on maintenance and operation of all systems and equipment provided under this Division.

3.06 WARRANTIES

A. The warranty period for all systems, equipment, components, work, etc. shall be no less than one (1) year, unless specified otherwise hereinafter and shall include at least one (1) full heating season and one (1) full cooling season. The warranty shall include parts and labor.

B. The Contractor shall, without cost to the Owner, remedy any defects within a reasonable time to be specified in notice from the Architect. In default thereof, the Owner may have such work done and charge all costs to the Contractor.

C. The start of the Contractor's warranty period, as defined in the General Conditions, shall commence on the issue of a "Certificate of Substantial Completion", by the Owner or the Owner's Representative for each item of material, equipment or system.

D. The Subcontractor shall confer with the General Contractor prior to the bid date concerning the project schedule and determine if there is a need to operate any items of equipment or systems for temporary heating and/or cooling or other reasons prior to "Substantial Completion". All required extended warranty costs for equipment, materials, and systems shall be included in the Subcontractor's bid.

END OF SECTION 220100

SECTION 220529 - HANGERS & SUPPORTS FOR PLUMBING PIPING & EQUIPMENT

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. The Conditions of the Contract and applicable requirements of Division 1, "General Requirements", and Section 22 01 00 "General Plumbing Requirements", govern this Section.

1.02 DESCRIPTION OF WORK

A. Work Included: Provide pipe hangers, supports, and required appurtenances as specified and indicated

1.03 QUALITY ASSURANCE

A. MSS Standard Compliance: Provide pipe hangers and supports of materials, design, and manufacture which comply with ANSI/MSS SP-58, SP-59, SP-89, and SP-90.

B. Acceptable Manufacturers: The model numbers listed in the Specification establish a level of quality and material. Subject to compliance with requirements, provide products and materials by the following:
   1. Anvil International,
   2. Fee and Mason,
   3. Central Iron Manufacturing Company, and
   4. F& S Manufacturing Company
   5. B-Line

PART 2 – PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS:

A. General: Provide pipe hangers and supports as specified. Comply with local codes and standards for pipe and equipment support and anchorage. Pipe supports shall be of material that will prevent electrolytic action.

B. Inserts: Provide Anvil No. 282 inserts for concrete construction.

C. Piping in Multiple Parallel Runs: Provide Anvil No. 45 or No. 50 with Anvil No. 137 U-bolt pipe clamps or structural channels or angles with U-bolt clamps, supported as trapeze hangers where multiple parallel runs of piping are shown. Select and size members for weights to be carried and span dimensions between supports.

D. Piping in Single Runs: Provide Fee and Mason Fig. 239 or Anvil No. 260 clevis hanger.

E. Hanger Rod: Provide hanger rods of required length. Rod diameters shall be as listed in the following table. Rod diameters may be adjusted after consultation

with the Structural Engineer concerning the building framing system, the method of attachment to the structure and the support rod spacing.

| Pipe Sizes | Rod Diameter |
|---|---|
| 3/4" - 2" | 3/8" |
| 2-1/2" – 3 | 1/2" |
| 4" – 5 | 5/8" |
| 6" | 3/4" |
| 8" – 12" | 7/8" |
| 14" – 18" | 1" |

F. Riser Clamps: Provide Fee and Mason Figure 241 riser clamps. Riser clamps for copper tube shall be copper-plated.

G. Saddles and Shields:
1. Saddles for Horizontal Insulated Piping without Vapor Barrier: At each hanger or support on horizontal runs, provide Anvil No. 160 or Fee and Mason Figure 171, 1710, 1712, or 172 saddles, as applicable. Shields as described below may be used instead of the saddles. On heating water systems below 140°F (60°C), hangers may be sized for the pipe size and of a material compatible with the pipe. Where dissimilar materials are used, provide dielectric separation. Carry insulation over the hanger and seal where hanger is sized for pipe.
2. Shields for Horizontal Insulated Water Piping with Vapor Barrier: At each hanger or support for water piping, provide a half section of preformed 6 PCF density fiberglass or rigid calcium silicate, with jacket of adjacent insulation brought across unbroken, supported on semicircular 16-gauge shields. Shields for pipe 4" and smaller shall be 12" long; shields for pipe 5" to 8" shall be 18" long; and shields for larger pipe shall be 24" long.

H. Piping on Roof: Roof mounted pipe supports are discouraged. If roof supports are necessary, installation methods must be approved by the architect, engineer, general contractor, and the Roofing Contractor.

PART 3 – EXECUTION

3.01 INSTALLATION:

A. Independent Support: Support fire sprinkler and standpipe piping independently of other piping in accordance with NFPA-approved methods and local codes and standards.

B. Provisions for Movement:
1. Movement: Install hangers and supports to allow controlled movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate the action of expansion joints, expansion loops, expansion bends, and similar units.
2. Load Distribution: Install hangers and supports so piping live and dead loading stresses from movement will not be transmitted to any pipe or connected equipment. Pipe supports shall properly transmit the weight of

the pipe and its contents to the building structure, or to independent posts, piers, or foundations.

3. Pipe Slopes: Install hangers and supports to provide the indicated pipe slopes so maximum pipe deflections allowed by ANSI B31 are not exceeded.

C. Insulated Piping: Comply with the following installation requirements:
   1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through the insulation; do not exceed pipe stresses allowed by ANSI B31.
   2. Shields: Where low-compressive-strength insulation of vapor barriers are indicated on cold, hot water piping, install coated protective shields. For pipe 8" and over, install rigid calcium silicate insulation between saddles and pipe.

D. Spacing: Install hangers and supports in piping systems to remove stress from equipment flanges and rotating equipment. Space hangers and supports as shown in the following tables.

Copper Pipe: Where copper piping/tubing is used and required to be suspended, spacing shall be based on the following:

| Trade Pipe Size | Maximum Spacing |
|---|---|
| 1-1/4" or smaller | 6' |
| 1-1/2" or larger | 10' |

Cast Iron Pipe: Where cast iron piping is used and required to be suspended, spacing shall be based on the following:

| Trade Pipe Size | Maximum Spacing |
|---|---|
| All Sizes | 5'* |

*Spacing of 10' may be used when 10' pipe lengths are utilized

PVC Pipe: Where PVC is used and required to be suspended, spacing shall be based on the following:

| Trade Pipe Size | Maximum Spacing |
|---|---|
| All Sizes | 4' |

CPVC Pipe: Where CPVC is used and required to be suspended, spacing shall be based on the following:

| Trade Pipe Size | Maximum Spacing |
|---|---|
| 1" and smaller | 3' |
| 1-1/4" and larger | 4' |

E. Saddles: Where insulation without vapor barrier is indicated, install protection saddles, or use hangers as indicated in Paragraph 2.0/G.1.

F. Guides: Install pipe guides complying with the manufacturer's published product literature. Where not otherwise indicated, install pipe guides near expansion loops, expansion joints, and ball joints.

G. Anchors: Install anchors at the proper locations to prevent stresses from exceeding those permitted by ANSI B31 and to prevent the transfer of loading and stresses to connected equipment. Anchors shall include vibration isolation in accordance with the pipe support system specified. Where the piping system is floating, the anchors shall be termed restraints or braces.
   1. Where expansion compensators are indicated, install anchors in accordance with the expansion unit manufacturers written instructions, to limit movement of piping and forces to the maximums recommended by the manufacturer of each unit.
   2. Where not otherwise indicated, install anchors at the ends of principal pipe runs and at intermediate points in pipe runs between expansion loops and bends. Make provisions for preset of anchors as required accommodating both expansion and contraction of piping.

H. Leveling: Adjust hangers and supports and place grout as required under supports to bring piping to proper levels and elevations.

I. Hangers: Refer to Section 23 05 48, "Vibration Isolation", for additional information and support requirements. Pipe hangers made of wood, wire, or sheet iron shall not be permitted.

J. Riser Supports: Vertical piping shall be secured at sufficiently close intervals to keep the pipe in alignment and carry the weight of the pipe and contents.
   1. Cast iron soil pipe shall be supported at the base and at each story level, but in no case at intervals greater than 10'.
   2. Steel pipe shall be supported at the base and at no less than every other story level, but in no case at intervals greater than 25'.
   3. Copper tube shall be supported at each story level, but in no case at intervals greater than 10'.
   4. Plastic pipe shall be supported at midpoint between floors and at ceiling to prevent movement, but in no case at intervals greater than 8'.

END OF SECTION 220529

# SECTION 220553 - IDENTIFICATION FOR PIPING AND EQUIPMENT

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 22 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the identification of equipment and piping. Comply with other Division 22 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the identification of equipment and piping specified herein and/or as indicated on the drawings.

### 1.02 DESCRIPTION OF WORK

A. Work Included: Identification of mechanical equipment shall consist of equipment labeling, pipe marking, and valve tagging as specified hereinafter.
   1. In general, all equipment shall be labeled. This shall include all central plant, air handling or air conditioning equipment, and other similar and miscellaneous equipment.
   2. Pipe markings shall be applied to all piping.
   3. Each valve shall be identified with a stamped tag. Valves and tagging shall be scheduled typewritten on 8 ½" x 11" paper, tabulating valve number, piping system, system abbreviation, location of valve (Room or area), and service (e.g. – 2nd Floor North Domestic Hot Water). The valve schedule shall be submitted to the Engineer for approval prior to ordering or installing valve tags. See Section 23 01 00, "General Mechanical Requirements" for information and requirements regarding Operation and Maintenance Manuals.
   4. Labels, tags, and markers shall comply with ANSI A13.1 and other applicable state and local standards for lettering size, colors, and length of color field.
   5. Equipment and device identification specified in other sections shall be provided as a part of those requirements.

### 1.03 ACCEPTABLE MANUFACTURERS

A. Labels, markings, and tags shall be manufactured by W.H. Brady, Seton, Allen, or Industrial Safety Supply.

## PART 2 - PRODUCTS

### 2.01 EQUIPMENT LABELING

A. Equipment labeling shall be one of the following, unless noted or specified otherwise:

1. Permanently attached engraved brass or plastic laminated signs with 1" high lettering. Signs on exterior equipment shall be brass.
2. Stencil painted identification, 2" high letters, with standard fiberboard stencils and standard black (or other appropriate color) exterior stencil enamel.

2.02 PIPE MARKINGS

A. On piping less than 6" diameter, install plastic semi-rigid snap-on type, manufacturer's standard pre-printed color-coded pipe markers extending fully around the pipe and insulation or pressure-sensitive vinyl pipe markers similar to the above. Pipe markings can also be applied with the stick type backing in lieu of the semi-rigid Snap-On-type. If label does not fully wrap the pipe, use zip ties or similar to fasten to piping.

B. On piping and insulation 6" and greater diameter, full band as specified above or strip-type markers fastened to the pipe or insulation with laminated or bonded application or by color-coded plastic tape not less than 1 ½" wide, full circle at both ends of the marker. Pipe markings can also be applied with the stick type backing in lieu of he semi-rigid snap-on-type.

C. Arrows for direction of flow provided integral with the pipe marker or separate at each marker.

2.03 VALVE TAGS

A. Valve tags shall be polished brass or plastic laminate with solid brass S hook and chain. Tags shall be stamped or engraved with the appropriate abbreviation for the type of service (e.g. – CHW, HW), as well as the designated valve number.

B. A valve schedule is to be provided to the Owner. For each page of valve schedules, a glazed display frame, with screws for removable mounting on masonry walls. Provide frames of finished hardwood or extruded aluminum, with SSB-grade sheet glass.

PART 3 - EXECUTION

3.01 GENERAL

A. Identification labeling, marking, and tagging shall be applied after insulation and painting has been completed.

B. Coordinate names, abbreviations, and other designations used in mechanical identification work with corresponding designations shown, specified, or scheduled on drawings. Prior to ordering any labels, markings, or tags, obtain the approval of the Engineer regarding names, abbreviations, etc.

C. The Plumbing, HVAC, and Fire Protection Contractors shall coordinate labeling, marking, and tagging to ensure consistent and coordinated identification. In existing buildings, utilize similar names, abbreviations, and other designations that are currently in use to remain consistent with existing identification.

D. Equipment labeling shall consist of unit designation as shown on the drawings. Exhaust fan labeling shall also indicate service or the room or area of service.

E. Pipe and ductwork markers shall be placed on piping and ductwork on 25' centers in mechanical rooms and concealed spaces. In locations where piping and ductwork is exposed, place markers on 50' centers. Flow directional arrows should be marked on the piping at taps from the main and riser.

F. Valve tags shall be placed on each valve except those intended for isolation of individual heat pumps or terminal units (e.g. - VAV boxes, fan coil units, unit heaters, etc.). Valve tag schedules shall be prepared as specified hereinbefore. Copies of one schedule shall be laminated in clear plastic and placed where directed by the Owner. Other sets shall be included in the Operating and Maintenance Manuals.

END OF SECTION 220553

# SECTION 220700 - PLUMBING INSULATION

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 22 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the insulation of Plumbing piping and equipment. Comply with other Division 22 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the insulation system specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

### 1.02 QUALITY ASSURANCE

A. Manufacturer: Approved manufacturers are Armstrong, Calsite, Cell-U-Foarm Corp, Ceelco, Certainteed Corp, Dow Chemical Company, Forrest Mfg Co, Foster / Chilers, Gemco, Johns Manville, Knauf Fiberglass, Midwest Fastners, Owens Corning Fiberglass, Pittsburg Corning Fiberglass, Rubatex, Trymer, and Venture Tape.

B. All insulation, jacket and adhesive shall have a fire and smoke hazard ratings as tested under ASTM E 84, NFPA 255, and UL 723 not exceeding:

| | |
|---|---|
| Flame Spread: | 25 |
| Fuel Contributed: | 50 |
| Smoke Developed: | 50 |

Exceptions: Type B Insulation and PVC Fitting Covers

### 1.03 SUBMITTALS

A. Per Section 22 01 00.

B. Product Data
1. Type A Insulation
2. Type B Insulation
3. Type C Insulation
4. Type D Insulation
5. Type E Insulation
6. Type F Insulation
7. Type G Insulation
8. Vinyl Lacquer Paint for Type B Insulation
9. Metal Jacket

1.04 DEFINITIONS

A. The phrase "Storm Drainage Conductor" refers to that portion of the storm drain interior to the building, between the roof drain body and where the pipe goes below grade.

B. The word "plenum" shall mean a ceiling space or mechanical room used for the transfer of conditioned return and/or outside air.

PART 2 - PRODUCTS

2.01 PIPING INSULATION

A. Type A – Fiberglass (indoor)
1. One Piece glass fiber, rigid molded sectional pipe covering with factory applied aluminum foil and white craft paper flame retardant vapor barrier jacket, conforming to ASTM C547, Class II, Mineral Fiber Preformed Pipe Insulation.
2. Thermal Conductivity (k) equals approximately 0.23 (BTU/HR., SF., Degree F, IN) at 75 °F.
3. Similar to Johns Manville Corp "Micro Lox 650 AP T", or approved equal.

B. Type B - Closed Cell (indoor)
1. Closed cell, flexible foamed plastic conforming to ASTM C534, "Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form." Insulation shall be suitable for a temperature range from –40 degrees F to 220 degrees F.
2. Conductivity (k) equals approximately 0.27 (BTUHR., SF., Degree F, IN) at 75 °F.
3. Similar to Armstrong "Armaflex", or approved equal.

C. Type C – Polyioscyanurate (outdoor)
1. Prefabricated 2 lb./cu.ft. density polyisocyanurate insulation with waterproof mastic and glass fiber jacket finished with an aluminum jacket with waterproof silicone caulk joints.
2. Conductivity (k) equals approximately 0.14 (BTUHR., SF., degrees F, IN) at 75 °F.
3. Insulation shall be applied per manufacturer's recommendations. Joint sealants and coatings shall be as approved by the insulation manufacturer for the intended application and service temperature range.
4. Jacketing shall be an all service jacket with 1 mm aluminum foil on pipe insulation and FSK jacket on board stock applied by the manufacturer to ASTMC-1136. Jacket shall have integral flap for sealing joint.
5. Similar to Trymer 9501, or approved equal.

2.02 EQUIPMENT INSULATION

A. Type Dh - Fiberglass Board (Hot Equipment)
1. Semi-rigid intermediate service fibrous glass board for operating temperatures greater than 850 degrees F.

2. Conductivity (k) equals approximately 0.23 (BTU/HR., SF., degrees F, IN) at 75 °F. Minimum density of 2.75 lb / cu ft.
3. Similar to Johns Manville Corp "1000 series Spin Glass", or approved equal.

B. Type Dc - Foamed Plastic (Cold Equipment)
1. Foamed plastic sheet suitable for operating temperatures between –40 degrees F and 22- degrees F.
2. Conductivity (k) equals approximately 0.27 (BTU/HR., SF., Degree F, IN) at 75 °F.
3. Similar to Armstrong "Armaflex", or approved equal.

C. Type E
1. Calcium silicate block conforming to ASTM C 553, Type I (1200 degrees F. max), asbestos free.
2. Conductivity (k) equals approximately 0.42 (BTU IN/HR., SF., degree F) per inch thickness at 200 °F.
3. Similar to Calsilite, or approved equal.

D. Type F
1. Insulation shall be 2" thick, minimum 3/4 lb. density fiberglass with an FSKL aluminum foil jacket, reinforced with fiberglass scrim.
2. Conductivity (k) equals approximately 0.27 (BTUHR., SF., degrees F, IN) at 75 °F.
3. Integral UL rated vapor barrier of:
   a. Aluminum foil reinforced with fiberglass scrim laminated to 30-lb. kraft paper.
   b. Class I white vinyl 0.004 inch thick, where specified.
4. Similar to Johns Manville Corp "Microlite", or approved equal

2.03 METAL JACKET

A. Smooth aluminum jacket 0.016 inch thick.

B. Integral polykraft or poly-surlyn moisture barrier.

C. Banded locking joints with field applied silicone weatherproof sealant.

D. Similar to Johns Manville Corp, or approved equal.

2.04 INSULATION ACCESSORIES

A. The following accessories shall be used in the application of the thermal insulations specified under this Section:
1. PVC Fittings Covers: similar to Johns Manville Corp "Zeston", or approved equal.
2. Pressure Sensitive polyester film tape to secure pipe insulation up to 12" outside diameter: Similar to 3M 30-80, or approved equal.
3. Vapor Seal Mastic: Similar to Childers CP-35, or approved equal.
4. Lagging Adhesive: Similar to Childers CP-52, or approved equal.
5. Wire: 16 gauge soft stainless steel.
6. Insulation Bonding Adhesive (To Metal): Similar to Childers CP-82, or approved equal.

7. Insulating and Finishing Cement: Similar to Insulco Smooth Kote, or approved equal.
8. Mechanical Fasteners - Welded or adhered pins with speed clip washers: Similar to Gemco Midwest Fasteners, or approved equal.
9. Bands for Equipment:
   a. Outside diameter of insulation is less than 24 inch: 1/2 inch x 0.020-inch (25 ga.) stainless steel.
   b. Where diameter is 36 inches or larger: 3/4 inch x 0.020 inch.
10. Bands for Piping: 1/2 inch x 0.020-inch stainless steel.
11. Wire Mesh: 1 inch by 20-gage stainless steel hexagonal wire netting.

PART 3 - EXECUTION

3.01 INSULATION APPLICABILITY

A. Heat Pump loop piping (tempered): No insulation required (except where exposed to freezing temperatures—see exterior piping for condenser water below for this condition).

B. Interior Hot Water, Chilled Water, and Condenser Water - Type A insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1 | up to 1-1/4 |
| 1-1/2 | 1-1/2 to 3 |
| 2 | 4 and up |

C. Exterior Hot Water, Chilled Water, and Condenser Water – Type C insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1 | up to 2-1/2 |
| 2 | 3 and up |

D. Condensate Drains (except in plenums and fire partitions/floors) – Type B insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| ½ | all |

E. Condensate Drains (inside plenums and fire partitions/floors) – Type A insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1/2 | up to 1 |
| 3/4 | 1-1/4 and up |

F. Horizontal storm leaders, roof drain bodies, and underside of drains receiving condensate from cooling coils – Type F insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|

| | |
|---|---|
| 2 | all |

G. Horizontal waste piping from electric water coolers – Type A insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1/2 | all |

H. Refrigerant Suction Lines & Valves (except in plenums and fire partitions/floors) – Type B

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1 | all |

I. Refrigerant Suction Lines & Valves (in plenums and fire partitions/floors), and hot gas bypass piping – Type A insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1 | all |

J. Outdoor cooling tower make-up water – Type C insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 2 | all |

K. Domestic Cold Water – Type A insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1 | all |

L. Domestic Hot Water and Tempered Water – Type A insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1 | up to 1-1/4 |
| 1-1/2 | 1-1/2 and up |

M. Garage domestic water piping exposed – Type A insulation required

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1 | all |

N. Boiler stack, breeching and converter – Type E insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 4 | all |

O. Emergency Generator Exhaust Piping and Muffler – Type E insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 4 | all |

P. Domestic Water Heaters shall be factory insulated.

Q. Cold equipment – Type Dc insulation required, minimum 1/2". Consult with equipment manufacturer as thickness may vary depending on service application and equipment manufacturer installation recommendations.

R. Hot equipment – Type Dh insulation required, minimum 2". Consult with equipment manufacturer as thickness may vary depending on service application and equipment manufacturer installation recommendations.

Notes:

a. The above thicknesses are the minimum required. All local codes and local energy codes shall be complied with.
b. All piping exposed to outdoors shall be insulated. All piping subject to freezing shall be provided with heat tracing. Coordinate insulation with heat trace cable and controls.
c. Insulation types and thickness are a minimum standard. Each application shall be carefully considered and insulation product type and thickness shall be appropriate for each specific application. Submit all insulation products with verification of their service intent.

3.02 PIPING INSULATION GENERAL REQUIREMENTS

A. Preparation
1. Do not apply insulation until piping has been leak tested.
2. All surfaces to be insulated shall be dry and free of loose scale, rust, dirt, oil or water.

B. Application:
1. Insulation shall be installed in a smooth, clean workmanlike manner. Joints shall be tight and finished smooth without fish-mouths.
2. Insulation shall fit tightly against the surface to which it is applied to prevent air circulation between the insulation and the pipe or equipment to which it is applied.
3. Insulation applied to cold piping or equipment shall be completely vapor sealed, free of pinholes or other openings.
4. Do not use wet insulation materials.
5. All longitudinal joints on vertical pipe runs shall be staggered.
6. Apply insulation so as to permit expansion or contraction of pipelines without causing damage to insulation or surface finish.
7. Do not apply mastic or adhesive until all previous applications of mastic and adhesives have thoroughly dried.
8. No bands or staples shall be provided on covering.
9. The adhesive used in connection with all covering work shall contain an approved vermin and rodent proof ingredient.
10. Provide 24-gauge sheet-metal saddle between the pipe hanger/support and the exterior of the insulation. Saddle length shall be the same as insulation inserts.

C. Application at Fittings:
   1. Insulation of flanges and flanged fittings shall overlap adjacent pipe covering at least 1 inch. Valves shall be insulated up to the gland only.
   2. Pipeline strainers shall be insulated in such a manner as to permit removal of strainer basket without disturbing insulation of the strainer body.
   3. Insulation adjacent to un-insulated flanges shall be tapered back and neatly finished so as to allow access to and removal of bolts without injury to covering.

3.03 TYPE A INSTALLATION

A. Tightly butt together sections of insulation on pipe runs sealing longitudinal seams of jacket with a self-sealing adhesive. Seal end joints with 4-inch wide straps of matching vapor barrier tape. Seal off ends of insulation with vapor seal mastic at valves, fittings and flanges. No further finish required. Mastic shall extend onto the bare pipe and over the insulation O.D.

B. PVC fitting jackets shall be used when they are available for the particular application. When molded or routed coverings are not available, the coverings shall be fabricated in the field similar to equipment insulation. Molded or routed fitting covers are highly recommended. Order PVC pre-curled.

C. Cold Piping:
   1. Cover valves, fittings and flanges with insulation having the same thickness as adjacent pipe covering, securing in place reforming tape up to 12" O.D. and ½" wide SST bands on larger O.D. Apply a PVC jacket and seal joints with PVC cement (solvent welding).

D. Hot Piping:
   1. Covers shall overlap the pipe insulation by the thickness of the insulation or 2" min. Cover valves, fittings and flanges with insulation similar to the adjacent pipe covering, securing in place with reforming tape up to 12" O.D. and ½" wide SST bands on larger O.D. Apply a PVC jacket and tape end joints to adjacent pipe insulation.
   2. Do not use PVC fitting jackets where the surface of the insulation is above 150 degrees F.

E. Exterior Piping:
   1. Exterior above grade water piping shall be finished with a weatherproof jacket and an aluminum jacket. Lap and seal joints as per manufacturer's instructions. Place laps to shed water.

3.04 TYPE B INSTALLATION

A. Type B insulation shall be slipped on the pipe prior to connection, and the butt joints shall be sealed. Where the slip on technique is not possible, the insulation shall be carefully slit and applied to the pipe.

B. All joints shall be completely butt sealed with the manufacturer's recommended adhesive.

C. Do not apply Type B insulation in multiple layers.

D. Type B insulation shall not be used in plenums nor firewall penetrations.

E. This Contractor shall paint Type B insulation exterior to the building with two coats of a vinyl acrylic paint recommended by the insulation manufacturer for protection against ultraviolet degradation and shall be flexible with no cracking. It is recommended in high humid areas to coat the insulation with a vapor barrier mastic to .037 min. DFT.

3.05 TYPE C INSTALLATION

A. Exterior
   1. Butter joints of insulation with non-setting adhesive. Secure with factory applied Self-Seal laps. Installation shall be as per manufacturer's guidelines.
   2. Finish shall be factory applied All Service Jackets. All fittings shall be finished with vapor seal mastic reinforced with white glass mesh. Minimum 0.037 thick DFT of mastic.
   3. Piping exposed in machine rooms shall be finished with vapor seal mastic and open weave membrane 10 x 10.
   4. Piping exposed to weather shall be finished with all service jacket and additional finish of 0.16 thick aluminum jacket. Aluminum jacket shall be secured with stainless bands located on maximum centers of 12 inches and at the overlap. No screws or pop rivets shall be used.
   5. Fittings and valves shall be finished with vapor seal mastic, reinforced with minimum 0.037" DFT of mastic, glass mesh and aluminum preformed fitting covers.

3.06 TYPE D INSTALLATION

A. Equipment Insulation Application:
   1. Apply insulation to fit as closely as possible to equipment.
   2. Stagger joints where possible.
   3. Bevel insulation around nameplates, ASME stamp and access plates.
   4. Insulation on equipment that must be opened periodically shall be constructed so insulation can be removed and replaced without damage.
   5. Do not install Type E insulation on aluminum surfaces or with aluminum jacket.

B. Hot Equipment:

1. Install 3/4-inch expanded metal over equipment with standing ribs or seams prior to applying insulation to eliminate ribs or seams penetrating through the insulation.
2. Secure the insulation with steel bands spaced on 12-inch centers.
3. Where required, use welded studs, clips or angles as anchors for wire or bands on flat surfaces.
4. Seal joints with insulating cement.
5. Over the insulation stretch 1-inch hexagonal mesh wire and lace the edges together.
6. Apply a 1/4-inch thick coat of finishing cement and trowel smooth.
7. Smooth insulation with lagging adhesive, cover with glass cloth and a final coat of lagging adhesive.
8. On small equipment where it is not practical, omit the wire mesh and finishing cement on Type D insulation.

C. Cold Equipment
1. Cover irregular surfaces with a smoothing coat of insulating cement.
2. Secure insulation with wire or with stainless bands spaced on 12-inch centers.
3. Seal joints with vapor seal mastic.

4. Embed a layer of glass into a 1/16-inch coating of vapor seal mastic. Then coat the outside of the glass cloth with a 1/16-inch coating of vapor seal mastic.

D. Roof Drain Bodies
1. Insulate similar to cold equipment.
2. Insulated boxes around roof drain bodies are not acceptable.

3.07 TYPE F INSTALLATION

A. Insulation Application:
1. Apply insulation tightly and smoothly to pipe.
2. Secure insulation on the bottom of pipes and other places where the insulation will sag and max 3" from any place.
3. Impale insulation over pins or anchors located not more than 18 inches apart and hold in place with washers and clips. Or contractor shall wire wrap insulation to pipe.
4. Cut off protruding pin after clips are secured and seal with 2-mil. aluminum foil backed pressure sensitive tape.
5. Apply insulation with joints tightly butted.
6. Cover all breaks, joints, punctures and voids with a vapor seal mastic and cover with a vapor barrier material identical to vapor barrier on the insulation, where gaps exceed 2".
7. Bevel insulation around nameplates, access plates and doors.
8. Insulation shall be continuous through walls and floors.

3.08 METAL JACKET INSTALLATION

A. Cover all piping insulation exposed to the exterior with metal jacket as specified herein.

3.09 HANGERS

A. Continue insulation through pipe hangers. Provide either rigid insulation inserts or sheet metal inserts at all outside pipe hangers. Provide rigid insulation inserts for piping operating below 60 °F. and sheet metal inserts for piping above 60 °F.

B. Provide rigid insulation (on non-insulated piping) or sheet metal inserts (on insulated piping) between the pipe and pipe hanger - shall be of a thickness equal to the adjoining insulation and shall be provided with vapor barrier where required. Insulation insert shall not be less than the following lengths:

| | |
|---|---|
| 1/2" to 2 1/2" pipe size | 10 Inches Long |
| 3" to 6" pipe size | 12 Inches Long |
| 8" to 10" pipe size | 16 Inches Long |
| 12" and over | 22 Inches Long |

C. Inserts for cold piping shall have a vapor barrier facing of the same material as the adjacent pipe insulation. Seal inserts into insulation with vapor seal mastic.

D. Sheet metal inserts shall be of steel sheet. Gauge shall conform to manufacturer's recommendation for pipe size. Sheet metal inserts shall have insulation filler of the same material as the adjacent pipe insulation.

3.10 PIPE SLEEVES

A. Pipe insulation and vapor barrier shall be continuous through sleeves in walls and floors.

B. Type B insulation shall not be used in sleeves through firewalls or fire rated (2-hour) floor systems. Use Type A or Type C through the sleeve instead and vapor seal the joint between the two insulations.

C. Provide 26 gauge galvanized steel or 0.020 inch aluminum jacket over insulation on pipe passing through sleeves where sealant is required.

D. Where penetrating interior walls, extend the metal jacket 2 inches out either side of the wall and secure each end with a metal band compressing the insulation slightly.

E. Where penetrating floors, extend the metal jacket 2 inches below the floor and 5 inches above the floor. Secure with metal bands.

END OF SECTION 220700

SECTION 221000 - PLUMBING PIPING

PART 1 - GENERAL

1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 22 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the plumbing piping systems. Comply with other Division 22 and 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the plumbing piping systems specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

1.02 DESCRIPTION OF WORK

A. Work Included: Provide complete operating plumbing piping systems including pipe, tube, fittings, and appurtenances as indicated and in compliance with these Specifications.

B. Applications: Applications of piping systems include, but are not limited to, the systems as listed below:

| Working System | Operating Pressure | Temperatures |
|---|---|---|
| Domestic Cold Water | | |
| High | 350 psig | 55 to 80°F |
| Medium | 300 psig | 55 to 80°F |
| Low | 150 psig | 55 to 80°F |
| Domestic Hot Water | | |
| High | 350 psig | 90 to 120°F |
| Medium | 300 psig | 90 to 120°F |
| Low | 150 psig | 90 to 120°F |
| Makeup Water | | |
| High | 350 psig | 55 to 80°F |
| Medium | 300 psig | 55 to 80°F |
| Low | 150 psig | 55 to 80°F |
| Sanitary Drainage | -- | -- |
| Storm Drainage | -- | -- |
| Acid Waste | -- | -- |
| Natural Gas | -- | -- |

1.03 QUALITY ASSURANCE

A. Welding: Qualify welding procedures, welders, and operators in accordance with ANSI B31.1, Paragraph 127.5, for shop and job site welding of piping work. Make welded joints on the piping system with continuous welds, without backing rings and with pipe ends beveled before welding. Gas cuts shall be true and free from burned metal. Before welding, surfaces shall be thoroughly cleaned. The piping shall be carefully aligned and no weld metal shall project inside the pipe.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

A. General: Provide pipe and tube of type, joint, grade, size, and weight (wall thickness, schedule or class) indicated for each service. Comply with applicable governing regulations and industry standards.
   1. Steel Pipe: ASTM A53, ASTM A106, or ASTM A120, black or hot-dipped galvanized as specified.
   2. Copper Tube: ASTM B88, Types "K", Type "L", or Type "M" copper water tube as defined by the Copper and Brass Research Association.
   3. Ductile Iron Pipe: ANSI A21.51, Class 150 with bell and spigot ends for push-on joints.
   4. Cast Iron Soil Pipe: ASTM A74, standard weight, hub and spigot-type.
   5. Hubless Cast Iron Pipe: CISPI 301-78, standard weight with spigot bead ends for coupling assembly.
   6. Polyvinyl Chloride (PVC) Pipe: Sewer main SDR 41, ASTM D3034 with bell ends and pre-inserted gasket joints.
   7. Pre-insulated Steel Pipe: ASTM A53, ASTM A106, ASTM A120, and ANSI B31.1.
   8. Polyvinyl Chloride (PVC) Water Pipe: Class 150, thickwall, Schedule 80, AWWA C90 mechanical joint.
   9. Copper Drainage Pipe: DWV copper piping.
   10. Polyvinyl Chloride (PVC) Drainage Pipe: Schedule 40 PVC.
   11. Chlorinated Polyvinyl Chloride (CPVC) Drainage Pipe: Schedule 40 CPVC. Type IV Grade I with cell classification of 23447 as defined in ASTM D1784. Rated for temperatures up to and including 200°F.

2.02 PIPE / TUBE FITTINGS

A. General: Provide factory-fabricated fittings of type, materials, grade, class, and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve, and equipment connections. Where not otherwise indicated, comply with governing regulations, industry standards, and where applicable, with pipe manufacturer's instructions for selections.
   1. Cast Iron Flanged Fittings: ANSI B16.1, Class 125 or Class 250, black or galvanized as specified, including bolting and gasketing.

2. Cast Iron Threaded Fittings: ANSI B16.4 or ASTM A126, Class 125 or Class 250, black or galvanized as specified.
3. Malleable Iron Threaded Fittings: ANSI B16.3, Class 150 or Class 300, black or galvanized as specified.
4. Malleable Iron Threaded Unions: ANSI B16.39, select for proper piping fabrication and service requirements including style, end connections, and metal-to-metal seats (iron, bronze, or brass), plain or galvanized as specified.
5. Threaded Pipe Plugs: ANSI B16.14.
6. Steel Flanges/Fittings: ANSI B16.5, including bolting, gasketing, and butt weld end connections.
7. Forged Steel Socket-welding and Threaded Fittings: ANSI B16.11, rated to match schedule of connected pipe.
8. Wrought Steel Butt-welding Fittings: ANSI B16.9, except ANSI B16.28 for short radius elbows and returns; rated to match connected pipe.
9. Cast Iron Drainage Fittings: ANSI B16.22 galvanized with pitched threaded ends.
10. Pipe Nipples: Fabricated from same pipe as used for connected pipe, except do not use less than Schedule 80 pipe where length remaining unthreaded is less than 1/2". Do not thread nipples full length (no all-thread nipples).
11. Wrought Copper/Bronze Solder-Joint Fittings: ANSI B16.22 suitable for working pressure up to 250 psig.
12. Hub-less Cast Iron Pipe Fittings: CISPI 301-78 and comply with governing regulations.
13. Cast Iron Soil Pipe Fittings: ASTM A74.
14. Compression Gaskets: CISPI HSN-75.
15. Lead/Oakum Joint Materials: Comply with governing regulations for service use indicated.
16. Grooved End Fittings: ASTM A47 or ASTM A536 joined with Victaulic Style 77 couplings and Grade "E" gaskets.
17. Flanged Fittings: Comply with ANSI B16.15 for bolt-hole dimensioning, materials, and flange-thickness.
18. Flange Bolts: Bolts shall be carbon steel ASTM A307 Grade A hexagon head bolts and hexagonal nuts. Where one or both flanges are cast iron, furnish Grade B bolts. Cap screws utilized with flanged butterfly valves shall be ASTM A307 Grade B with hexagon heads.
19. Flange Bolt Thread Lubricant: Lubricant shall be an anti-seize compound designed for temperatures up to 1000°F and shall be Crane Anti-Seize Thread Compound or approved equal.
20. Polyvinyl Chloride (PVC) Fittings: ASTMD-2665, Lasco or Spears Manufacturing high strength sewer fittings.
21. Copper Drainage Fitting: DWV copper drainage fittings.

B. Miscellaneous Piping Materials/Products:
   1. Welding Materials: Comply with ASME Boiler and Pressure Vessels Code, Section II, Part C, for welding materials.
   2. Brazing Materials: American Welding Society, AWS A5.B, Classification BCup-5.

3. Gaskets for Flanged Joints: 1/8" thick gaskets. Ring-type shall be used between raised face flanges and full face-type between flat face flanges with punched bolt holes and pipe opening. Gaskets shall be Garlock Style 3400 compressed non-asbestos or equal.
4. Insulating (Dielectric) Unions: Provide dielectric unions at all pipe connections between ferrous and nonferrous piping. Unions shall be "Delvin" as made by Pipeline Seal and Insulator Company or "EPCO" as made by Epco Sales, Inc. and shall have nylon insulation or equal.
5. Gaskets for Cast Iron Soil Pipe: ASTM C 564, neoprene, compression-type.
6. Push-on-Joints: ANSI A21.11, rubber compression-type, "Tyton Joint" as manufactured by US Pipe or equal.
7. Hub-less Cast Iron Joints: CISPI 310, stainless steel corrugated shield and clamp assembly over one piece neoprene sealing sleeve.

2.03 VALVES

A. Service Valves
1. Block (Stop) Valves: Ball valves 2" and smaller shall be red brass, cast bronze, or yellow forged bronze with brass, stainless steel, or bronze ball and stem, 150 psig nonshock WOG at 200°F, Jenkins Fig. No. 900T. Valves 2 1/2" and larger shall be butterfly type, 200 psig nonshock WOG at 200°F, ANSI Class 150 with ductile iron lug body. The replaceable resilient elastomer seat shall be Buna N or EPDM. The disc shall be silicon or aluminum bronze and shaft shall be No. 316 or No. 416 stainless steel. Secondary O ring seals shall be provided at the top and bottom of the upper and lower shafts to guarantee zero leakage to the shaft.
2. Balancing Valves: Valves shall comply with the general requirements specified for block valves. Valves used for balancing shall have adjustable memory stops or position indicators.
3. Gate Valves: As a general rule, gate valves shall not be used for sizes 2 1/2" and smaller. If necessary, with prior approval from the Construction Manager, valves 2-1/2" and smaller shall be 200 psig WOG bronze body with screwed bonnet and ends. Valves 3" and larger shall be 200 psig WOG.
4. Globe Valves: Valves 2" and smaller shall be bronze body, bronze rising stem, screw in bonnet, renewable seat, and screwed or solder ends. Valves 2 1/2" and larger shall be 200 psig WOG, outside screw and yoke (OS&Y), iron body, bronze-trimmed, renewable seat, Pressure Class 125, with ANSI B16.1 flanged ends.

B. Check Valves: Domestic water pipes 2 1/2" and larger shall be spring-loaded, quiet type. Valve nonshock pressure temperature rating shall be as specified for piping in which it is installed. Valve shall be full-threaded, lug body, or flanged body. Threaded valves installed at pump discharge shall have its shaft perpendicular to the pump shaft. Valves located in pumped sewage pipes and in storm pipes shall be outside weight, 200 pounds WOG, iron body, bronze trimmed, with swing check design.

C. Relief Valve: Temperature and pressure, self-closing, lever operated with thermo-bulb extension, 3/4", ANSI B2.1 taper thread male inlet connection,

210°F (98.8°C) and 125 psig setting, ANSI Z1.22, Type No. 40XL Watts Regulator Company or similar.

D. Reduced Pressure Backflow Preventer: Backflow preventer shall be Watts Regulator No. 909 Series, 2 1/2" and larger shall be provided with dual "Y" pattern spring-loaded check valves and independent relief valve located between checks, or similar or as noted on placns. Backflow preventers shall be rated for pressure up to 150 psig working pressure at 140°F (60°C) and sized according to the maximum design flow.

E. Domestic Water Pressure Reducing Valves: Watts 223S, Clayton 90G 01, or similar or as noted on plans. Pressure and flow schedule as indicated on the Drawings.

PART 3 - EXECUTION

3.01 PIPING INSTALLATION

A. General:
1. Industry Practices: Install pipe, tube, and fittings in accordance with recognized industry practices which will achieve permanently leak-proof piping systems, capable of performing each indicated service without failure or degradation of service. Install each run with a minimum of joints and couplings, but with adequate and accessible unions or flanged connections to permit disassembly for maintenance/ replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings. Align accurately at connections. Coordinate piping locations with other trades to avoid conflict. Give ductwork preference unless directed otherwise by the Engineer.
2. Systems: Install piping parallel or perpendicular to lines of building, true to line and grade, and with sufficient hangers to prevent sags between hangers. Provide fittings at changes in direction. Piping in finished areas shall be concealed, except in mechanical rooms. Where pipes of different sizes join, provide reducing elbows, tees, or couplings. Bushings will not be acceptable.
3. Expansion and Contraction: Install loops, offsets, sizing joints, and expansion joints, as necessary, to avoid strain resulting from expansion and contraction of piping systems on fixtures and equipment. Provide mechanical grooved connections required by the application to reduce vibration at equipment connections. Provide expansion joints in piping systems by mechanical grooved connections where required.

B. Steel Pipe: Ream steel pipe after cutting and before threading. Thread with clean-cut taper threads of length to engage all threads in fittings and leave no full-cut threads exposed after make-up.

C. Copper Pipe: Cut copper pipe square and ream to remove burrs. Clean fitting socket and pipe ends with sand cloth or wire brush.

D. PVC Pipe: Cut PVC pipe square and remove all burrs. Clean fitting and pipe butt prior to installation. Install all PVC piping in accordance with the manufacturer's recommendations.

E. Final Connections to Equipment Furnished by Owner or Under Other Divisions of These Specifications: Where equipment is to be furnished under other Divisions of these Specifications or by the Owner, such equipment will be delivered to the site, uncrated, assembled, and set in-place under those other Divisions of these Specifications or under the separate contracts. Any required automatic control valves shall also be provided under those other Divisions of these Specifications or other separate contracts. Make all final connections of hot water, condenser water, gas, domestic water, waste, and vent as required. Provide valves, unions, strainers, check valves, and traps as required for proper operation of systems and equipment. Equipment not shown on the Architectural Drawings or noted by the Architect and/or Engineer shall not be included in the scope of this requirement.

F. Excavation, Installation, and Backfill for Underground Pipe:
1. Layout: Pipes shall be laid and pipe joints made in presence of the General Contractor and field measurements, layouts, batter board alignment, grade establishments, and similar locations shall be performed by a Professional Engineer in the employ of the Contractor. The Contractor's engineer shall be on the job during all underground work. A "Bench-Mark" reference shall be provided by the General Contractor.
2. Pipe Grading: Lay and maintain all pipes at required lines and grades during the course of the Work.
3. Trench: Excavate the trench to the depth required. Properly brace and de-water the trench and keep it free of water during installation, testing pipe, and backfilling. No water shall be discharged onto the street or freeway without approval by the Owner.
4. Excavation: The trench shall be at least 18" wider than the maximum diameter of the pipe or largest bell and the pipe shall be laid in the center of the trench. The trench shall be excavated to a depth sufficient to provide for pipe cushions or supports as specified. Trench width may be increased as required and piling left in place until sufficient compacted backfill is in place. Properly sheet and brace all open trenches to render them secure and remove all such sheeting and bracing before completing the backfill. Comply with all applicable national, state, and local codes and regulations. The quantity of excavation required to install sheeting and the installation and removal of sheetings and bracings will not be regarded as Extra Work. All costs incurred for this excavation and the installation of sheeting shall be included in the Contract Price.

5. Grading: Upon completion of excavation and prior to the laying of the pipe, the trench bottom shall be brought up to the required elevation with a pipe cushion, except where the cushion has been eliminated by the General Contractor. Pipe cushions shall be select material deposited in the trench and shall be compacted, leveled off,

and shaped to obtain a smooth compacted bed along the laying length of the pipe. Pipe cushion material shall be as follows:

a. Domestic Water Pipes: Material for pipe cushion shall comply with local codes and conform with the geo-technical report. In absence of local code requirements and/or geo-technical report, the cushion shall be bank sand or select backfill material approved by the General Contractor. Any material used shall pass a one-inch screen.

b. Sanitary and Storm Sewers: Material for pipe cushion shall comply with local codes and conform with the geo-technical report. In absence of local code requirements and/or geo-technical report, the cushion shall be bank sand or select backfill material approved by the General Contractor. Any material used shall pass a one-inch screen.

6. Anchors: Cast iron pipes shall have concrete anchors at each change in direction and/or as directed. Any change in direction exceeding 15 degrees shall be anchored. Concrete anchors shall rest against solid (virgin) ground with the required area of bearing on pipe and ground to provide suitable anchoring.
7. Backfill: Backfill trenches only after piping has been inspected, tested, and approved by the General Contractor. Backfill shall be provided as recommended in the geo-technical report included in these Contract Documents, or in the absence of a geo-technical report, as required by site conditions. Refer to Division 2 or elsewhere in the Contract Documents for additional trenching and backfill requirements.
8. Existing Surfaces: Restore existing streets, driveways, and sidewalks damaged during the excavation work to acceptable condition, subject to approval by the Owner.
9. Safety: Provide street and sidewalk excavations with approved barricades, warning lights, and cover plates as required by the local authorities.

3.02 PLUMBING SERVICES

A. Scope:
1. This Contractor shall provide the building sanitary sewer to 5 feet outside the building and shall extend the domestic water service from the main shutoff valve stubbed above floor in the building.
2. Provide storm drainage system as required to 5 feet outside the building.
3. Verify locations and conditions.

B. General: Install the various piping systems as described hereinafter, and as required by the local plumbing inspection department.
1. Slope domestic hot and cold water piping to drain and provide with hose valves (drain valves) at low points.
2. Install soil, waste, and vent piping with horizontal lines pitched in accordance with local codes, but in no case less than 1/4" per foot for pipe 2-1/2" and smaller, and 1/8" per foot for pipe 3" and

larger. Install soil, waste, and vent piping with hubs of each length of piping in the upstream position.

3. Make-up lead and oakum joints with molten lead run into hubs in one continuous pour, to a minimum depth of one inch.
4. Make-up "Ty-Seal" or "Dual-Tite" gasketed joints using lubrication and joining tools as instructed by the manufacturers. Base of stacks, horizontal runs under pressure, and gasketed pipe 5" and larger shall be made up using "Lubrifast" joining material.
5. Torque "No-Hub" joints in accordance with manufacturer's instructions. Do not install "No-Hub" joints below ground.
6. Provide chrome-plated piping at each fixture installed in a finished space. Install with proper strap wrenches to avoid marking or defacing.
7. Provide proper restraints on riser and stack offsets.

C. Plumbing Connections to Fixtures and Equipment:
1. General: Provide necessary pipe and fittings. Make final connections to provide cold water make-up and natural gas supply to mechanical equipment. Locate cold water make-up and gas supply where shown and connect with suitable stop valves.
2. Cold Water Make-up: Provide cold water make-up to closed loop condenser water circulating systems, cooling tower system, and hot water heating systems.
3. Gas Supply: Provide gas supply separately metered to an approved location for future routing to kitchen locations.

D. The domestic water service shall be Class 150 AWWA cement lined C.I. with Class 250 fittings, mechanical joints or push-on rubber ring gaskets, ASTM A377-66 or PVC AWWA C900 with solvent welded fittings. Provide tie rods and thrust blocks as required.

3.03 MAKE-UP WATER PIPING SYSTEMS

A. Connections: Connect domestic water to automatic fill and manual quick-fill connections on each piping system as indicated on Drawings. Provide reduced pressure backflow preventers at each system.

B. Compatibility: Use piping and fittings of same material type as materials of the domestic water supply.

3.04 DOMESTIC HOT AND COLD WATER PIPING SYSTEMS

A. Interior Hot and Cold Water Piping:
1. Piping 3" and smaller, Type "L" copper tubing with wrought copper solder end fittings. At the Contractor's option, this piping may be as specified for piping 4" and larger.
2. Piping 4" and larger, Schedule 40, galvanized steel pipe, ASTM A120 with galvanized malleable iron fittings, or galvanized cast iron flanged fittings.
3. Provide isolation fitting whenever dissimilar materials are used.
4. Option: At the Contractor's option, for piping 3" or larger, Victaulic Style 77 couplings, Victaulic fittings and tees may be used instead

of the above, if Victaulic groove depth control tool is used for field grooving. Victaulic flanges and reducing couplings shall not be installed.

5. Piping Run-outs to Fixtures: Provide piping run-outs to fixtures sized to comply with governing regulations. Each fixture shall be provided with a shut-off valve for each supply line. Provide all shutoff valves necessary to isolate mains to each restroom. Exposed lines shall be chromium-plated.

B. Air Chambers: Provide the necessary air chambers, shock absorbers, or water hammer arrestors, specifically sized for the application to prevent water hammer.

1. All water hammer arrestors shall be PDI certified, size A, B, C, D, E, F, as indicated and/or as appropriate for the fixtures served. Josam, Zurn, or Jay R. Smith.
2. Water hammer arrestors shall be installed at the top of each riser, and on each fixture branch, with quick closing valves, in accordance with Plumbing and Drainage Institute Standard WH201.

3.05 UNDERGROUND DOMESTIC WATER SERVICE & FIRE PROTECT. PIPING

A. Piping Two-and-a-half Inches and Smaller: Type "K", copper tubing with wrought copper brazed end fittings.

B. Piping Three Inches and Larger: Ductile iron bell and spigot, push-on joint, pressure water pipe. Joints shall be of the push-on-type employing a molded rubber gasket retained in a ring recessed into the inside of the bell. Pipe and joints shall be manufactured by Tyler Pipe and Foundry Company or equal. Coat pipe and fittings inside and outside with the manufacturer's standard coal tar enamel suitable for domestic water service. PVC AWWA C900 piping with solvent welded fittings can be used where acceptable by the local authorities. PVC used in return air plenums shall be wrapped with UL listed plenum wrap (UL 910 & 1887).

3.06 STORM AND SANITARY DRAINAGE PIPING SYSTEMS

A. Soil, Waste, and Vent Piping Underground: Service weight cast iron soil pipe and fittings with lead and oakum joints or neoprene gasket joints made up with "Lubrifast" joining material or PVC piping with solvent welded joints. Provide and install code-approved manholes as required.

1. Grease waste piping and/or waste piping in commercial kitchen applications shall be service weight cast iron from floor drains, floor sinks, or hub drains to connection to grease trap or connection to civil sanitary piping. PVC piping is not permitted on waste or grease waste piping in commercial kitchen applications.

B. Storm Drainage Piping Underground: Same as soil, waste, and vent piping underground.

C. Soil, Waste, and Vent Piping Above Ground: Service weight cast iron soil pipe and fittings with neoprene gasket joints or hub-less cast iron pipe and fittings with coupling assembly.

1. Option: At the Contractor's option, for branch piping only, galvanized steel, Schedule 40, ASTM A53 pipe with galvanized malleable iron fittings for vent piping and galvanized cast iron drainage fitting for soil and waste piping may be used instead of the above. NOTE: Use PVC piping with solvent welded joints only where allowed by code. PVC used in return air plenums shall be wrapped with UL listed plenum wrap (UL 910 & 1887).

D. Storm Piping Above Ground: Service weight cast iron soil pipe and fittings with neoprene gasketed joints or Schedule 40, service weight hub-less cast iron soil pipe and fittings with coupling assembly, or Schedule 40 PVC pipe with PVC drainage fittings. NOTE: Use PVC only where allowed by code. PVC used in return air plenums shall be wrapped with UL listed plenum wrap (UL 910 & 1887).

E. Pump Discharge Piping: Discharge from pumps to the horizontal gravity main shall be Schedule 40 galvanized steel with galvanized cast iron drainage fittings, or Schedule 40 PVC piping and fittings where code allows. Each pump discharge shall be carried separately to the horizontal gravity main and shall discharge into the top of the horizontal gravity main. PVC used in return air plenums shall be wrapped with UL listed plenum wrap (UL 910 & 1887).

F. Cleanouts:
1. General: Care shall be used when locating cleanouts. Wherever possible, do not place cleanouts in "finished" areas. All locations shall be approved by the Architect.
2. Finished Floor: Jay R. Smith No. 4434, cast iron adjustable assembly with nickel bronze cover and tapered thread bronze plug. Provide clamping collar when installed in floors having waterproof membrane.
3. Unfinished Areas: Jay R. Smith No. 4434 cleanout with cadmium-plated, cast iron plug.
4. Walls: Jay R. Smith No. 4434, cast iron with nickel bronze, square, smooth, access cover, vandal-proof screws.
5. Outside: Jay R. Smith No. 4434, non-slip, vandal-proof cover.
6. Locations:
   a. At base of every drainage stack
   b. Maximum distance between cleanouts is 90 feet.
   c. At turns greater than 45 degrees.
   d. Other locations required by local code.

## 3.07 NATURAL GAS PIPING SYSTEM

A. Code Compliance Products: Comply with local utility company codes and AGA regulations which require the products used for gas piping work to be selected from lists in certain published standards or coded as indicated.

B. Gas Piping: Gas piping intended for operation at pressures of 5 psig or greater shall be ASTM A53, Schedule 40, black steel joined by Schedule 40, black welding fittings. Gas piping intended for operation at

pressures less than 5 psig shall be ASTM A53, Schedule 40, black steel joined by Schedule 40, black welded fittings or Class 150 pounds, banded, black malleable iron, threaded fittings. Paint piping safety yellow.

C. Concealed Piping and Protection: Gas piping run concealed in walls, chases, or above ceilings shall be installed as required by local codes and the serving utility company.

D. Underground Piping: Gas piping installed below grade shall be coated with Republic Steel Corporation (US) "X-Tru-Coat" high density polyethylene extruded coating, factory-applied with a fluid mastic to a minimum thickness of 0.040". Field welds, joints, and fittings shall be protected with mastic undercoat and by wrapping at least two layers of "X-Tru-Tape" installed as instructed by manufacturer. Polyethylene piping and fittings may be used if approved by the local authorities.

3.08 CLEANING, FLUSHING, TESTING, AND INSPECTING

A. Cleaning: Clean exterior surfaces of installed piping systems and prepare surface for application of any required coatings.

B. Flushing: Flush piping systems with clean water prior to performing any required tests.

C. Piping Tests:
1. General: Blank off equipment during tests. Perform tests before piping is enclosed in walls, floors, partitions or in any other way concealed from view. Tests may be performed in sections. Tests shall be witnessed by the General Contractor and local inspectors and the test results presented to the Engineer for acceptance and approval prior to concealing piping from view. Provide all necessary equipment for testing, including pumps and gauges. Note: All test results are to be submitted to the Engineer as specified in Section 22 01 00.
2. Domestic Water Systems: Test hot and cold water systems hydrostatically to a pressure of 150 psig or 1-1/2 times working pressure, whichever is greater, for a period of 4 hours. Repair all leaks, replacing materials as necessary, and repeat tests until systems are proven tight.
3. Soil, Waste, and Vent Piping System: Test soil, waste, and vent piping by plugging all openings and filling system to height required by City Plumbing Inspector, but not less than 10', except the top floor. Inspect all joints for leaks, repair all leaks found, and retest until piping is demonstrated to be free from leaks. In addition to water test, apply peppermint or smoke tests, if required by local code. All underground main piping shall be inspected with a camera and the taped test results submitted to the Owner. Provide test tees throughout the system to test the system in sections if plastic piping is used above grade.
4. Storm Drainage Piping System: Test storm drainage piping same as specified for Soil, Waste, and Vent Piping System.
5. Natural Gas Piping System: Test natural gas piping with compressed air or nitrogen at 5 times service pressure but not less

than 100 psig for 24 hours and in accordance with the requirements of the local codes and the serving utility company. Repair all leaks, replacing materials as necessary, and repeat test until systems are proven tight.

6. Disinfecting of Water Systems: Disinfect as required by code. Where code does not dictate tests to be conducted, at a minimum disinfect the hot and cold water systems as follows: Fill systems with water solution containing 50 ppm available chlorine; allow to stand for 4 hours, opening and closing all valves several times during this period; thoroughly flush; refill and place system in service; ensure a chlorine content of 2.5 ppm.
7. Cleaning and Adjusting: Thoroughly clean and disinfect all plumbing fixtures, including all exposed trim. Adjust all flush valves for proper flushing, but without excess use of water.

D. Inspecting: Visually inspect each run of each system for completion of joints, adequate hangers, supports, and inclusion of accessories.

END OF SECTION 221000

# SECTION 223300 - ELECTRIC DOMESTIC WATER HEATERS AND ACCESSORIES

## 1.0 GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 22 0100, Division 01 0000 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the plumbing water heaters and associated accessories. Comply with other Division 22 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the water heaters and accessories specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

### 1.02 DESCRIPTION OF WORK

A. Work Included: This section and the accompanying drawings cover the provisions of all labor, equipment, appliances, and materials and performing all operations in connection with the construction of the water heating systems as specified herein and as shown, and/or as required to provide complete and operating systems.

### 1.03 QUALITY ASSURANCE

A. Manufacturers: Provide products equal to the following:

1. Rheem Water Heating Division
2. Lochinvar
3. A. O. Smith, Inc.
4. Ruud
5. State

B. Electrical Standards: Provide electrical products which have been tested, listed, and labeled by Underwriters' Laboratories, Inc. (UL) and which comply with National Electrical Manufacturers' Association (NEMA) standards.

## 2.0 PRODUCTS

### 2.01 ELECTRIC WATER HEATERS

A. Heaters shall be guaranteed for 3 years against tank failure. Tanks shall be glass-lined with a minimum of 3" fiberglass insulation, factory-installed

magnesium anodes, immersion type heating elements, high limit control and other necessary operating and safety controls.

B. Provide a combination pressure and temperature relief valve complying with ANSI 21.22 with full size discharge pipe.

3.0 EXECUTION

3.01 INSTALLATION OF WATER HEATERS

A. Installation of electric water heaters shall be in accordance with manufacturer's written instructions.

B. A drain pan is to be installed under all water heaters. The drain for the pan is to be piped to the nearest floor drain, mop basin or other approved point of safe discharge. The water heater needs to be installed at an elevation that will permit gravity draining of the drain pan. Install piping and appurtenances so that discharge will not overflow from drain.

3.03 TEMPERATURE SETTING

A. For water heaters serving general lavatories, the mixed water temperature shall be set to 110°F. For water heaters serving kitchen areas and/or mop sinks, set water temperature at 140°F, or as required by local codes.

B. Where a water heater is shown to serve lavatories and kitchens and/or mop sinks, provide a mixing valve such that both water temperatures can be achieved from a common system.

C. Water heaters with storage capabilities shall store water at a minimum of 140°F.

3.03 COORDINATION

A. Coordinate with electrical work as necessary.

END OF SECTION 223300

# SECTION 224000 - PLUMBING FIXTURES

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 22 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the plumbing fixtures. Comply with other Division 22 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the plumbing fixtures specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

### 1.02 DESCRIPTION OF WORK

A. Acceptable Manufacturers: The model numbers listed in the Specifications establish a level of quality and material. The following manufacturers are acceptable subject to compliance with the requirements of these Specifications.

1. Fixtures
   a. American Standard
   b. Kohler Company
   c. Toto
   d. Moen Incorporated
   e. Zurn Industries, Inc.
2. Faucets
   a. Chicago Faucet Company
   b. Speakman Company
   c. T & S Brass and Bronze Works, Inc.
   d. Delta
   e. Zurn Industries, Inc.
   f. Moen Incorporated
3. Flush Valves
   a. Sloan Valve Company
   b. Delany Flush Valves
   c. Zurn Industries, Inc.
   d. Moen Incorporated
4. Seats
   a. Church Products, Forbes-Wright Ind., Inc.
   b. Olsonite Corporation
   c. Beneke Corporation
   d. Bemis
5. Carriers
   a. Zurn Industries, Inc.
   b. J. R. Smith Mfg. Co.
   c. Wade Div./Tyler Pipe
6. Drinking Fountains

a. Halsey Taylor - Div. Household Int. Co.
b. Elkay Mfg. Company
c. Ebco/Oasis
d. Filtrine Manufacturing Company

7. Stainless Steel Sinks
   a. Elkay Mfg. Company
   b. Just Mfg. Company
   c. Moen Incorporated

PART 2 - PRODUCTS

See drawings for Fixture Schedule. If fixture schedule contains unique fixture brand not listed within the specifications, the fixture schedule shall take precedence.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Heights: Set fixtures at heights as shown on the Architect's Drawings.

B. Caulking: This Contractor shall caulk the joint between the finished wall surface and all plumbing fixtures. Verify colors with the Architect. Caulking material shall comply with the appropriate section of these Specifications.

C. Emergency Shower: Install an emergency shower and eye wash adjacent to the chemical treatment feeder system, and in other locations as required by code or as indicated on the drawings. Pipe domestic cold water to shower.

D. Insulation: All ADA accessible fixtures with exposed piping shall have insulation kit installed to meet the requirements of ADA.

E. Each fixture shall be provided with a shut-off valve for each supply line. All exposed lines shall be chromium-plated.

END OF SECTION 224000

# SECTION 230100 - GENERAL MECHANICAL REQUIREMENTS

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Division 23 includes Division 23 01 00 of the Specifications and Mechanical Drawings (HVAC). Elements of the Scope of Work include, but are not limited to, labor, materials, equipment, supplies, storage, transportation and all required permits, fees and licenses. Division 23 does not stand alone, but is part of the complete project and its Documents. Requirements of the General Conditions and Division 1 apply to all work in the Division.

B. Provide the necessary interface with other Divisions to provide a complete project. Carefully check the Documents of this Division with those Documents of other Divisions. Determine the requirements of any interfacing materials or equipment being furnished and/or installed by those Sections and Divisions, and provide proper installation and required interface.

C. No deviation from the Contract Documents shall be made without the written consent of the Architect and Engineer.

D. All Specifications and Drawings are to be considered together as the Contract Documents. Any work shown in one and not the other, or is implied by either, shall be provided to make a complete project. Should conflicts exist between the Specifications and Drawings or there is an item shown or noted for which is not clearly defined, immediately submit a request for clarification. Under no circumstance will conflicts between the Specifications and Drawings be grounds for additional cost to the Contract after the Contract is established.

E. The Drawings are schematic and are not intended to show the exact location of duct, piping, equipment, etc.

F. Dimensions and information regarding accurate locations of equipment, and structural limitations and finish shall be coordinated and verified with other Divisions of Work. Be prepared to furnish dimensions and information regarding the Work of this Division to other trades.

G. The right is reserved to relocate any device (receptacle, switch, fire alarm, audio/visual, junction box, outlet, etc.) a maximum of 10'-0" before it is permanently installed without incurring additional cost to the Contract.

### 1.02 REFERENCE STANDARDS

A. All work shall comply with the most recently revised versions of all local, state and federal codes, ordinances of the authority having jurisdiction, laws, rules and regulations. Any modifications required by any of the above shall be made without any additional cost to the Owner. Where

requirements between governing Codes and Regulations vary, the more restrictive provision shall apply.

B. Nothing contained in the Contract Documents shall be construed as authority or permission to disregard legal requirements and regulations. The Contractor shall thoroughly review the Documents and bring any such conflicts to the attention of the Architect and Engineer prior to Installation.

C. All materials, installation, and workmanship shall comply standards and/or codes of the following:
1. International Building Code – 2018 edition, with latest Georgia amendments
2. International Mechanical Code - 2018 edition, with latest Georgia amendments
3. International Plumbing Code - 2018 edition, with latest Georgia amendments
4. International Fuel Gas Code - 2018 edition, with latest Georgia amendments
5. International Fire Code - 2018 edition, with latest Georgia amendments
6. International Energy Conservation Code - 2015 edition, with latest Georgia amendments
7. National Electrical Code, 2020 edition
8. National Fire Protection Association
9. State of Georgia (ANSI 117.1) Handicap Code
10. ANSI - American National Standards Institute
11. ASTM - American Society of Testing and Materials
12. NEMA - National Electrical Manufacturer's Association
13. OSHA - Occupational Safety and Health Act
14. UL - Underwriter's Laboratories
15. ASHRAE - American Society of Heating and Air Conditioning Engineers
16. SMACNA - Sheet Metal and Air Conditioning Contractors' Nat'l Assoc.

D. All materials shall be new and shall bear the label of UL.

1.03 EXISTING CONDITIONS

A. Where work is to be performed in an existing facility, the contractor shall visit the site prior to bid and be familiar with all existing conditions. Special attention shall be given to work to be performed above an existing ceiling.

B. Where existing slabs are to be cut or core drilled, the contractor shall x-ray the existing slabs to avoid cutting or disrupting existing conduits, cables, plumbing or structural members.

C. HVAC systems, plumbing systems, and electrical service to the building shall not be interrupted without written consent of the building owner.

D. No allowance will be made for lack of knowledge of existing conditions.

E. At the completion of the project, all work under this Division shall be completely integrated with the existing systems and left in perfect operating condition.

F. Where work under this Division disrupts the continuity of any existing to remain electrical circuit or feeder, the Contractor shall repair/replace as necessary to return to a perfectly functional and safe operating condition.

G. Prior to any demolition or construction the Contractor shall have the existing conditions inspected by an EPA, OSHA certified asbestos abatement agency to identify the presence of asbestos. Should any asbestos be found it shall be brought to the immediate attention of the Architect and Owner and specifically identified in writing.

1.04 DEFINITIONS

A. Provide: to furnish, install and connect.

B. Furnish: to supply all materials, labor, equipment, testing apparatus, controls, tests, accessories and all other items customarily required for the proper and complete application.

C. Install: to join, unite, fasten, link, attach, set-up or connect together, complete, tested, and ready for normal satisfactory operation.

D. Engineer: the Engineer of record.

E. Contract Documents: the complete set of Specifications and Drawings of all Divisions.

F. Work: labor, materials, equipment, accessories, controls and other items required for a complete installation.

G. Concealed: embedded in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces or in enclosures.

H. Exposed: not installed underground or concealed.

I. Equal: equal in quality, workmanship, materials, weight, size, design and efficiency of the specified product, conforming with manufacturers.

J. Supply: to purchase, procure, acquire and deliver complete with related accessories.

K. Authority Having Jurisdiction (AHJ): applicable local, state and federal authorities having jurisdiction over any part of the Scope within this Division and other Divisions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer's names and catalog numbers specified in the Contract Documents are intended to describe the material and set the standard of quality. All bids shall be based on material specified. Request for approval of material not specified shall be considered if the request is in written form and submitted to the Architect no later than fourteen (14) days prior to the bid date. All requests shall conform to the provisions of the general and supplementary conditions.

B. When specific names are not stated, only the best available quality of material or equipment shall be submitted for review and used in the installation.

2.02 BASIS OF DESIGN

A. Where a product is designated as "BASIS OF DESIGN", the Contractor is notified that mechanical, electrical, structural, architectural, space conditions and/or other features of the overall project design have been based on the requirements of the "BASIS OF DESIGN" product.

B. Where a product is substituted for a "BASIS OF DESIGN" product, the Contractor shall notify the design team that changes in project design may be mandatory in order to permit use and installation of the substitute product. Shop drawing submittal for a substitute product shall include a complete schedule of changes in project design, if any, which must be made in order to permit use and installation of the substitute product. The Contractor shall be responsible for the coordination of all trades for use of the substituted product. The Contractor shall bear all expenses related to the use of a substitute product.

2.03 SHOP DRAWINGS AND PRODUCT DATA

A. The Contractor shall obtain complete shop drawings, product data and samples from the manufacturers, suppliers, vendors, and all Division 23 Subcontractors, for all materials and equipment as specified herein in various Sections of the Specifications, and shall submit data and details of such materials and equipment for review by the Architect and Engineer. Prior to submission of the shop drawings, product data and samples to the Architect and Engineer, the Contractor shall thoroughly review the shop drawings, product data and samples and certify they are in compliance with the Contract Drawings. Further, the Contractor shall check all materials and equipment upon their arrival on the Project site and verify their condition and compliance with the Contract Documents. Any Work which proceeds prior to receiving reviewed shop drawings shall be modified as required to comply with the Contract Documents and the shop drawings. A minimum period of ten (10) working days, exclusive of transmittal time, will be required in the Engineer's office each time a shop drawing, product data and/or sample is submitted or resubmitted for review. This time period shall be considered by the Contractor when scheduling his Work. The initial shop drawing review for equipment and

materials may be expedited through the mutual consent of the Contractor, Architect, Engineer, and Owner providing the Contractor agrees to submit complete, certified, documented, and coordinated shop drawings for review in accordance with the requirements of the Contract Documents.

B. The review of shop drawings, product data, and samples by the Architect and Engineer shall not relieve the Contractor of the responsibility for dimensions or errors that may be contained therein, or for deviations from requirements in the Contract Documents. It shall be clearly understood that the noting of some errors by the Engineer but overlooking others does not grant the Contractor permission to proceed in error.

C. All shop drawings and product data/submittals shall be submitted in compliance with the requirements of the general and supplementary conditions. No more than four (4) copies of submittal data will be reviewed. Any additional copies will be returned unmarked. The responsibility of copying review comments on any additional copies will rest solely with the Contractor.

D. All product data/submittals shall bear the name of the manufacturer to be used.

E. All shop drawings and submittals shall include a stamped indication signifying that the submittal has been reviewed for compliance with the Contract Documents by the Contractor. This stamped indication also represents the fact that the Contractor has checked this submittal for its interaction with all other Divisions and certifies by his signature or initials that all coordination has taken place. The stamp shall include the date, name of the Contracting Firm, the signature of the Contractor, certification of compliance and approval. This stamp shall be on the submittal before the Engineer will review it.

F. The Engineer will review an individual submittal not more than twice. If the submittal is rejected again on the second review, the Contractor will bare all responsibility for paying for the Engineer's time for additional reviews. Such payments to the Engineer shall be withheld from the next monthly pay application.

G. Shop drawings and/or product data shall be submitted for the following for review:

1. HVAC duct system layouts, including supply air, return air, exhaust air, and outside air. HVAC piping system layouts. These drawings must include associated equipment, drawn to scale based on submittals for that equipment, must be dimensioned, and must include duct, piping and equipment elevation tags (distance above finished floor to bottom).
   The Contractor is encouraged to develop their own shop drawings, without having have had the Engineer's CAD files (as previously stated, the Engineer's drawings are schematic/diagrammatic in nature). Should the Contractor insist on using the Engineer's CAD files in the procurement of shop

drawings, the Contractor must pay the Engineer $ 150.00 per sheet for the CAD files.
The Contractor shall give the Engineer a written release, acceptable to the Engineer, signed by a corporate officer of the Contractor. This release shall also include a copyright statement indicating that these drawings or electronic data contained will not be used on any other project. The release and payment for the files must be received PRIOR to delivery of the CAD files.

2. Equipment, including but not limited to: chillers, cooling towers, boilers, pumps, heat exchangers, rooftop units, split systems, fans, heaters, water-cooled self-contained units, water-source heat pumps, coils, air distribution devices (diffusers, etc.), air terminal units (PIU's, etc.), ductwork accessories, louvers, hoods, heat tracing, insulation, piping specialties, etc.

2.04 AS-BUILT DRAWINGS

A. The Contractor shall maintain on a daily basis at the Project site a complete set of "Record Drawings". The "Record Drawings" shall consist of a set of black-line or blue-line prints or AutoCAD files of the Contractor Coordination Drawings for this Division. The prints shall be marked or the AutoCAD file electronically updated to show the precise location of all work and equipment, and all changes and deviations in the work from that shown on the Contract Documents. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or work without definite instructions from the Architect or Engineer. The continuously updated coordination drawings (shop drawings previously described) shall be used to produce the final "Record Drawings" which shall be delivered to the Owner in AutoCAD electronic format (CD) upon Project completion.

B. Record dimensions shall clearly and accurately delineate the work as installed; locations shall be suitably identified by at least two dimensions to permanent structures.

C. The Contractor and Subcontractor shall mark all "Record Drawings" on the drawings with a rubber stamp impression or an AutoCAD image that states such.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The equipment selections used in the preparation of the Contract Documents will fit into the physical spaces provided and indicated, allowing ample room for access, servicing, removal and replacement of parts, etc. Adequate space shall be allowed for clearance in accordance with the Code requirements and the requirements of the local Authorities having jurisdiction, and the equipment manufacturer's recommendations.

B. In the preparation of Drawings, a reasonable effort to accommodate acceptable equipment manufacturer's space requirements has been made. However, since space requirements and equipment arrangement vary according to each manufacturer, the responsibility for initial access, maintenance access, code required access, and proper fit rests with the Contractor.

C. Physical dimensions and arrangements of equipment to be installed shall be subject to the Architect's and Engineer's review.

D. The General Contractor and all Subcontractors shall coordinate the installation of ductwork, conduit, busway, piping, cable trays, etc., installation with lighting fixtures, special ceiling construction, air distribution equipment, and the structure. Provide additional rises, drops and offsets as required. If after installed, new ductwork, conduit, busway, piping or cable is found to be in conflict with the architecture, structure, or other trade Work which is either existing or shown on the Contract Documents, the ductwork, conduit, busway, piping or cable shall be relocated without additional cost to the Owner.

E. No ductwork, piping, equipment, etc., shall be installed in the eight (8) inch high zone directly above the ceiling in tenant areas to allow for tenant build-out and flexibility unless otherwise specifically shown on the Drawings or prior written authorization is received from the Engineer.

F. Accessibility and Clearance:
   1. Mechanical equipment, ductwork, piping, etc. shall be installed in accessible locations, avoiding obstructions, preserving headroom, and keeping openings and passageways clear.
   2. Minor adjustments in the locations of equipment shall be made where necessary, providing such adjustments do not adversely affect functioning of the equipment.

G. Scaffolds and staging for installation of mechanical work shall be provided under the work of this Division.

3.02 STRUCTURAL FITTINGS

A. Furnish and install the necessary sleeves, inserts, hangers, anchor bolts, and related structural items. Install at the proper time.

B. Openings may have been indicated on the Architectural and Structural drawings. Should any additional openings or holes be required, the same shall be provided at no additional cost to the Owner.

C. Location: At a time in advance of the work, verify openings shown on the Architectural and Structural drawings, and coordinate any additional openings.

D. If the work of this Section requires modification of the Architectural or Structural drawings, furnish new instructions as to requirements for these openings. Submit for review and coordination to Architect.

E. Sleeves shall be supplied for mechanical piping passing through walls or slabs and shall be placed before concrete is poured.

F. Equipment supports for mechanical work shall be fastened to the structure by inserts, anchor bolts, bolting to drilled and tapped structural members, or be welded to the structure.
   1. Welding shall be done by the electric arc method with fully competent welders. Supporting members shall be shop coated with a suitable primer.
   2. Surfaces damaged by installation of supports shall be touched up with primer to match shop coat. Any drilling of structural members shall be approved by the Architect.

G. Flashing:
   1. Wherever ductwork and/or piping pass through the roof or outer walls, base flashing and counter-flashing shall be provided.
   2. Such flashing shall be properly installed by skilled workmen, and shall include grouting, mastic or tar application, or other means to insure a permanent, waterproof, neat and workmanlike installation.
   3. Insofar as possible, flashing shall comply with and be similar to requirements for flashing in General Construction Work.

H. Anchor bolts and inserts shall be galvanized and of adequate size and strength for installation of electrical work and shall be placed in forms before concrete is poured.
   1. Placement of bolts in bases shall be done under other Division. Furnish detail drawings, templates, and anchor bolts for bases to the General Contractor in time to avoid delaying work schedules.
   2. Expansion shields shall only be used with specific approval of the Architect. Wooden or soft metal plugs shall not be used.

I. Cutting and patching:
   1. All additional cutting, patching and reinforcement of construction of building, subject to review by the Architect, shall be performed under this Section.
   2. Refer to appropriate Division for requirements.

3.03 WEATHERPROOF EQUIPMENT

A. Mechanical devices or equipment located in damp, semi-exposed areas shall be weather-resistant. Enclosures shall comply with NEMA Type 3R requirements.

B. Air distribution devices located in damp areas outside shall be weather-resistant (aluminum, etc.).

3.04 CLEANING

A. Brush and clean work prior to concealing, painting and acceptance. Perform in stages if directed.

B. Painted exposed work soiled or damaged: Clean and repair to match adjoining work before final acceptance.

C. Remove dust and debris from inside and outside of material and equipment.

3.05 TESTS AND DEMONSTRATIONS

A. All systems shall be tested in the presence of the Owner or an Owner designated representative upon completion of the Work and demonstrates that the installation is in accordance with the Contract Documents.

B. All motors shall be checked and adjusted for correct direction of rotation.

C. Any work found not to be in compliance with the Contract documents shall be repaired or replaced without incurring additional cost to the Contract price.

D. Provide all instruction to the Owner on maintenance and operation of all systems and equipment provided under this Division.

3.06 WARRANTIES

A. The warranty period for all systems, equipment, components, work, etc. shall be no less than one (1) year, unless specified otherwise hereinafter and shall include at least one (1) full heating season and one (1) full cooling season. The warranty shall include parts and labor.

B. The Contractor shall, without cost to the Owner, remedy any defects within a reasonable time to be specified in notice from the Architect. In default thereof, the Owner may have such work done and charge all costs to the Contractor.

C. The start of the Contractor's warranty period, as defined in the General Conditions, shall commence on the issue of a "Certificate of Substantial Completion", by the Owner or the Owner's Representative for each item of material, equipment or system.

D. The Subcontractor shall confer with the General Contractor prior to the bid date concerning the project schedule and determine if there is a need to operate any items of equipment or systems for temporary heating and/or cooling or other reasons prior to "Substantial Completion". All required extended warranty costs for equipment, materials, and systems shall be included in the Subcontractor's bid.

END OF SECTION 230100

# SECTION 230529 - HANGERS & SUPPORTS FOR HVAC PIPING & EQUIPMENT

## PART 1 – GENERAL

### 1.01 RELATED DOCUMENTS

A. The Conditions of the Contract and applicable requirements of Division 1, "General Requirements", and Section 23 01 00 "General Mechanical Requirements", govern this Section.

### 1.02 DESCRIPTION OF WORK

A. Work Included: Provide pipe hangers, supports, and required appurtenances as specified and indicated

### 1.03 QUALITY ASSURANCE

A. MSS Standard Compliance: Provide pipe hangers and supports of materials, design, and manufacture which comply with ANSI/MSS SP-58, SP-59, SP-89, and SP-90.

B. Acceptable Manufacturers: The model numbers listed in the Specification establish a level of quality and material. Subject to compliance with requirements, provide products and materials by the following:
   1. Anvil International,
   2. Fee and Mason,
   3. Central Iron Manufacturing Company, and
   4. F& S Manufacturing Company
   5. B-Line

## PART 2 – PRODUCTS

### 2.01 PIPE HANGERS AND SUPPORTS:

A. General: Provide pipe hangers and supports as specified. Comply with local codes and standards for pipe and equipment support and anchorage. Pipe supports shall be of material that will prevent electrolytic action.

B. Inserts: Provide Anvil No. 282 inserts for concrete construction.

C. Piping in Multiple Parallel Runs: Provide Anvil No. 45 or No. 50 with Anvil No. 137 U-bolt pipe clamps or structural channels or angles with U-bolt clamps, supported as trapeze hangers where multiple parallel runs of piping are shown. Select and size members for weights to be carried and span dimensions between supports.

D. Piping in Single Runs: Provide Fee and Mason Fig. 239 or Anvil No. 260 clevis hanger.

E. Hanger Rod: Provide hanger rods of required length. Rod diameters shall be as listed in the following table. Rod diameters may be adjusted after consultation

with the Structural Engineer concerning the building framing system, the method of attachment to the structure and the support rod spacing.

| Pipe Sizes | Rod Diameter |
|---|---|
| 3/4" - 2" | 3/8" |
| 2-1/2" – 3 | 1/2" |
| 4" – 5 | 5/8" |
| 6" | 3/4" |
| 8" – 12" | 7/8" |
| 14" – 18" | 1" |

F. Riser Clamps: Provide Fee and Mason Figure 241 riser clamps. Riser clamps for copper tube shall be copper-plated.

G. Saddles and Shields:
1. Saddles for Horizontal Insulated Piping without Vapor Barrier: At each hanger or support on horizontal runs, provide Anvil No. 160 or Fee and Mason Figure 171, 1710, 1712, or 172 saddles, as applicable. Shields as described below may be used instead of the saddles. On heating water systems below 140°F (60°C), hangers may be sized for the pipe size and of a material compatible with the pipe. Where dissimilar materials are used, provide dielectric separation. Carry insulation over the hanger and seal where hanger is sized for pipe.
2. Shields for Horizontal Insulated Water Piping with Vapor Barrier: At each hanger or support for water piping, provide a half section of preformed 6 PCF density fiberglass or rigid calcium silicate, with jacket of adjacent insulation brought across unbroken, supported on semicircular 16 gauge shields. Shields for pipe 4" and smaller shall be 12" long; shields for pipe 5" to 8" shall be 18" long; and shields for larger pipe shall be 24" long.

H. Piping on Roof: Roof mounted pipe supports are discouraged. If roof supports are necessary, installation methods must be approved by the architect, engineer, general contractor and the Roofing Contractor.

PART 3 – EXECUTION

3.01 INSTALLATION:

A. Independent Support: Support fire sprinkler and standpipe piping independently of other piping in accordance with NFPA-approved methods and local codes and standards.

B. Provisions for Movement:
1. Movement: Install hangers and supports to allow controlled movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate the action of expansion joints, expansion loops, expansion bends, and similar units.
2. Load Distribution: Install hangers and supports so piping live and dead loading stresses from movement will not be transmitted to any pipe or connected equipment. Pipe supports shall properly transmit the weight of

the pipe and its contents to the building structure, or to independent posts, piers, or foundations.

3. Pipe Slopes: Install hangers and supports to provide the indicated pipe slopes so maximum pipe deflections allowed by ANSI B31 are not exceeded.

C. Insulated Piping: Comply with the following installation requirements:

1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through the insulation; do not exceed pipe stresses allowed by ANSI B31.
2. Shields: Where low-compressive-strength insulation of vapor barriers are indicated on cold, chilled, or heating water piping, install coated protective shields. For pipe 8" and over, install rigid calcium silicate insulation between saddles and pipe.

D. Spacing: Install hangers and supports in piping systems to remove stress from equipment flanges and rotating equipment. Space hangers and supports as shown in the following table. Rod spacing may be adjusted after consultation with the Structural Engineer concerning the building framing system, the method of attachment to the structure and the support rod diameters.

| Trade Pipe Size | Maximum Spacing |
|---|---|
| 1/2" | 5' |
| 3/4" | 6' |
| 1" and 1-1/4" | 7' |
| 1-1/2" | 9' |
| 2" | 10' |
| 2-1/2" | 11' |
| 3" | 12' |
| 4" | 14' |
| 5" | 16' |
| 6" | 17' |
| 8" | 19' |
| 10" | 22' |
| 12" | 23' |
| 14" | 25' |
| 16" | 27' |
| 18" | 28' |

E. Saddles: Where insulation without vapor barrier is indicated, install protection saddles, or use hangers as indicated in Paragraph 2.0/H.1.

F. Guides: Install pipe guides complying with the manufacturer's published product literature. Where not otherwise indicated, install pipe guides near expansion loops, expansion joints, and ball joints.

G. Anchors: Install anchors at the proper locations to prevent stresses from exceeding those permitted by ANSI B31 and to prevent the transfer of loading and stresses to connected equipment. Anchors shall include vibration isolation in accordance with the pipe support system specified. Where the piping system is floating, the anchors shall be termed restraints or braces.

1. Where expansion compensators are indicated, install anchors in accordance with the expansion unit manufacturers written instructions, to limit movement of piping and forces to the maximums recommended by the manufacturer of each unit.
2. Where not otherwise indicated, install anchors at the ends of principal pipe runs and at intermediate points in pipe runs between expansion loops and bends. Make provisions for preset of anchors as required accommodating both expansion and contraction of piping.

H. Leveling: Adjust hangers and supports and place grout as required under supports to bring piping to proper levels and elevations.

I. Hangers: Refer to Section 23 05 48, "Vibration Isolation", for additional information and support requirements. Pipe hangers made of wood, wire, or sheet iron shall not be permitted.

J. Riser Supports: Vertical piping shall be secured at sufficiently close intervals to keep the pipe in alignment and carry the weight of the pipe and contents.
1. Cast iron soil pipe shall be supported at the base and at each story level, but in no case at intervals greater than 10'.
2. Steel pipe shall be supported at the base and at no less than every other story level, but in no case at intervals greater than 25'.
3. Copper tube shall be supported at each story level, but in no case at intervals greater than 10'.
4. Plastic pipe shall be supported at mid point between floors and at ceiling to prevent movement, but in no case at intervals greater than 8'.

END OF SECTION 230529

# SECTION 230548 - VIBRATION ISOLATION

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the vibration isolation systems. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the vibration isolation systems specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

### 1.02 DESCRIPTION OF WORK

A. Work Included: Provide vibration isolation work as specified and indicated, including the following:
   1. Support isolation for motor-driven mechanical equipment
   2. Inertia base frames in conjunction with equipment isolation
   3. Support isolation of air-handling housings
   4. Isolation including support isolation for piping risers
   5. Support isolation of piping
   6. Flexible ductwork connections

### 1.03 QUALITY ASSURANCE

A. General: Except as otherwise indicated, obtain support isolation units from a single manufacturer.

B. Supervision: Manufacturer shall provide technical supervision of the installation of support isolation units produced by him and of associated inertia bases.

C. Manufacturers: Provide vibration isolation support units manufactured by one of the following or an approved equal: Amber-Booth, Vibrations Mounting and Controls, Inc., Korfund Dynamics Corporation, Consolidated Kinetics Corporation.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

A. Chilled, Condenser and Heating Hot Water Pumps: Provide concrete inertia bases with structural steel pouring forms sized and reinforced as required for the intended service. Size bases to support the piping elbow supports and furnish with Type RSW recessed spring isolators properly sized

for one-inch static deflection. Mount springs on concrete bases 3-1/2" high. Inertia base is not required for pumps installed on slabs on grade.

B. Suspended Fans: Isolate with not less than four combination spring and rubber-in-shear vibration isolators.

C. Cooling Towers: Design and coordinate the structural supports with the Structural Engineer. Isolate towers with spring isolators with springs sized for 2" static deflection. Isolator housing to be hot-dipped galvanized springs to be neoprene-coated. Provide tie-down adjustment to prevent excessive movement when tower is drained. Towers located on grade do not require vibration isolation.

D. Fluid Cooler Mounted on Ground: System is internally isolated; no special vibration isolation is required.

E. Suspended Heat Pump Units: Unit shall be isolated with hanger and vibration isolation kit supplied by unit manufacturer or a vibration isolation manufacturer.

F. Suspended Fan & Coil Unit: Isolate with not less than four combination spring and rubber "in-shear" vibration isolators.

G. Flexible Pipe Connections at Cooling Tower: Isolate supply and return piping to the cooling tower with flanged rubber, spherical double-arch expansion joints.

H. Flexible Pipe Connections at Rotating Equipment: Isolate supply and return piping to each pump with braided metal hose connectors between pump and valve.

I. Flexible Ductwork Connections to Equipment: Install flexible connections between sheet metal ductwork and equipment or fan collar. Locate as close to fan as possible. Isolate the duct system from the equipment by at least 1".

J. Roof Mounted Air Handling Units: Provide housed spring type isolators with vertical limit stops. Provide with 1" deflection (0 to 500 rpm) or .75" deflection (501 and over rpm).

PART 3 - EXECUTION

3.01 ISOLATOR PERFORMANCE

A. General: Comply with the minimum static deflections recommended by the American Society of Heating, Refrigerating and Air Conditioning Engineers, including the definitions of critical and non-critical locations, for the selection and application of vibration isolation materials and units as indicated.

B. Manufacturer's Recommendations: Except as otherwise indicated, comply with manufacturer's instructions for selection and application of vibration isolation materials and units.

3.02 RELATED WORK EXAMINATION

A. Examination and Reporting: Installer of vibration isolation work shall observe the installation of other work related to and connected to vibration isolation work. After completion of other related work (but before equipment start-up), installer shall furnish a written report to the Contractor, with a copy to the Engineer, listing observed inadequacies for proper operation and performance of vibration isolation work.

B. Correction and Start-up: Do not start-up equipment until inadequacies have been corrected in a manner acceptable to the vibration isolation Installer.

3.03 EQUAL LOADING

A. General: Equipment installed on vibration isolating mountings shall be level after load is applied. Further vibration isolating mountings shall be selected and installed to compensate for unequal loading. Spring isolators with coils touching during equipment start-up or operation will not be acceptable.

END OF SECTION 230548

# SECTION 230553 - HVAC EQUIPMENT AND PIPING IDENTIFICATION

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the identification of equipment and piping. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the identification of equipment and piping specified herein and/or as indicated on the drawings.

### 1.02 DESCRIPTION OF WORK

A. Work Included: Identification of mechanical equipment shall consist of equipment labeling, pipe marking, and valve tagging as specified hereinafter.

1. In general, all equipment shall be labeled. This shall include all central plant, air handling or air conditioning equipment, and other similar and miscellaneous equipment.
2. Pipe markings shall be applied to all piping.
3. Each valve shall be identified with a stamped tag. Valves and tagging shall be scheduled typewritten on 8 ½" x 11" paper, tabulating valve number, piping system, system abbreviation, location of valve (Room or area), and service (e.g. – 2nd Floor North Domestic Hot Water). The valve schedule shall be submitted to the Engineer for approval prior to ordering or installing valve tags. See Section 23 01 00, "General Mechanical Requirements" for information and requirements regarding Operation and Maintenance Manuals.
   Labels, tags, and markers shall comply with ANSI A13.1 and other applicable state and local standards for lettering size, colors, and length of color field.
4. Equipment and device identification specified in other sections shall be provided as a part of those requirements.

### 1.03 ACCEPTABLE MANUFACTURERS

A. Labels, markings, and tags shall be manufactured by W.H. Brady, Seton, Allen, or Industrial Safety Supply.

PART 2 - PRODUCTS

2.01 EQUIPMENT LABELING

A. Equipment labeling shall be one of the following, unless noted or specified otherwise:
   1. Permanently attached engraved brass or plastic laminated signs with 1" high lettering. Signs on exterior equipment shall be brass.
   2. Stencil painted identification, 2" high letters, with standard fiberboard stencils and standard black (or other appropriate color) exterior stencil enamel.

2.02 PIPE MARKINGS

A. On piping less than 6" diameter, install plastic semi-rigid snap-on type, manufacturer's standard pre-printed color-coded pipe markers extending fully around the pipe and insulation or pressure-sensitive vinyl pipe markers similar to the above. Pipe markings can also be applied with the stick type backing in lieu of he semi-rigid snap-on-type.

B. On piping and insulation 6" and greater diameter, full band as specified above or strip-type markers fastened to the pipe or insulation with laminated or bonded application or by color-coded plastic tape not less than 1 ½" wide, full circle at both ends of the marker. Pipe markings can also be applied with the stick type backing in lieu of the semi-rigid snap-on-type.

C. Arrows for direction of flow provided integral with the pipe marker or separate at each marker.

2.03 VALVE TAGS

A. Valve tags shall be polished brass or plastic laminate with solid brass S hook and chain. Tags shall be stamped or engraved with the appropriate abbreviation for the type of service (e.g. – CHW, HW), as well as the designated valve number.

B. A valve schedule is to be provided to the Owner. For each page of valve schedules, a glazed display frame, with screws for removable mounting on masonry walls. Provide frames of finished hardwood or extruded aluminum, with SSB-grade sheet glass.

PART 3 - EXECUTION

3.01 GENERAL

A. Identification labeling, marking, and tagging shall be applied after insulation and painting has been completed.

B. Coordinate names, abbreviations, and other designations used in mechanical identification work with corresponding designations shown,

specified, or scheduled on drawings. Prior to ordering any labels, markings, or tags, obtain the approval of the Engineer regarding names, abbreviations, etc.

C. The Plumbing, HVAC, and Fire Protection Contractors shall coordinate labeling, marking, and tagging to ensure consistent and coordinated identification. In existing buildings, utilize similar names, abbreviations, and other designations that are currently in use to remain consistent with existing identification.

D. Equipment labeling shall consist of unit designation as shown on the drawings. Exhaust fan labeling shall also indicate service or the room or area of service.

E. Pipe and ductwork markers shall be placed on piping and ductwork on 25' centers in mechanical rooms and concealed spaces. In locations where piping and ductwork is exposed, place markers on 50' centers. Flow directional arrows should be marked on the piping at taps from the main and riser.

F. Valve tags shall be placed on each valve except those intended for isolation of individual heat pumps or terminal units (e.g. - VAV boxes, fan coil units, unit heaters, etc.). Valve tag schedules shall be prepared as specified hereinbefore. Copies of one schedule shall be laminated in clear plastic and placed where directed by the Owner. Other sets shall be included in the Operating and Maintenance Manuals.

END OF SECTION 230553

# SECTION 230593 - TESTING, ADJUSTING, AND BALANCING

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the testing, adjusting, and balancing of HVAC systems. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Provide testing, adjusting, and balancing specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

### 1.02 DESCRIPTION OF WORK

A. Work Included:
1. All air and water systems shall be tested, adjusted, and balanced to optimize operating and comfort conditions. Record test data as outlined hereinafter and submit for review and approval. Systems shall be fully tested and balanced prior to Building commissioning and acceptance.
2. Conduct tests as specified herein, and as required by authorities having jurisdiction, including Local Inspection Department or Construction Manger.
3. Repair or replace defects discovered or resulting from the required tests to a like new condition.
4. All tenant finish air balancing will be by the tenant finish contractor. All air and water moving equipment installed under the shell building contracts will be balanced by the shell contractor.

### 1.03 QUALITY ASSURANCE

A. Personnel: Submit evidence to show that the personnel who will actually balance the systems are qualified. Evidence showing that the personnel have passed the tests required by the Associated Air Balance Council (AABC) or the National Environmental Balancing Bureau (NEBB) will be sufficient.

## PART 2 - PRODUCTS

Not applicable.

## PART 3 - EXECUTION

### 3.01 TEST DATA

A. General: Record test data after balancing has been completed and deliver recorded data to the Engineer for review and evaluation. Should deficiencies or

discrepancies be found, repeat balancing procedures to achieve correct test data results. Certify the test and balancing data as being true and correct over the Contractor's signature. Execute the Certification by an authorized officer if the contracting firm is a corporation, by a partner if the firm is a partnership, by the firm's owner if the firm is a sole proprietorship, or by the authorized representative if the firm is a joint venture. Include a copy of the approved test and balancing data in the Owner's Manual.

B. Test Forms: Record and submit test and balancing data on forms similar to those of the AABC or NEBB.

3.02 CALIBRATION TEST

A. Submit evidence to show that the balancing devices are properly calibrated before proceeding with system balancing.

3.03 PRELIMINARY AIR TESTING

A. General: Preliminary air tests shall be performed before duct work or equipment is enclosed in walls, floors, ceilings, chases, or in any other way concealed from view. Tests may be conducted on individual systems. Submit notification when systems are ready for preliminary air tests. Condenser water shall not be required for preliminary air tests. Make necessary arrangements to energize fan motors for the tests. Where possible, conduct the tests before the application of exterior duct insulation and installation of grilles or diffusers. Remove section of duct to allow design airflow at design static pressure where necessary.

B. Tests: Demonstrate that there is no excessive leakage of the duct work by visual inspection, that fans are operating at essentially the correct speed, that motors will not overload, and that equipment delivers design cfm. Correct any deficiencies found. Repeat preliminary air tests until tests have proven satisfactory.

C. Inspection: Inspection and acceptance of the Work shall, in addition to the foregoing requirements, be subject to the following conditions:
   1. Instruments: Test instruments, devices, and similar items, their accuracy and the methods by which instruments are employed, shall be approved by AABC or NEBB for use at the job site.

3.04 PRESSURE TESTING FOR SMOKE CONTROL SYSTEMS

A. General: Pressure tests shall be performed before duct work or equipment is enclosed in walls, floors, ceilings, chases, or in any other way concealed from view. Pressure tests shall be conducted on all individual systems. Submit notification when systems are ready for pressure tests and all testing methods and results shall be documented.

B. Tests: Demonstrate that leakage does not exceed 5% of the design airflow for each system (Smoke Exhaust, Make-up Air, Stairwell Pressurization, Atrium Exhaust, etc.) when tested at a minimum of 1.5 times the scheduled static pressure. Correct any deficiencies found. Repeat pressure tests until tests have proven satisfactory.

3.05 PRESSURE TESTING FOR DUCTS 3" W.G. AND HIGHER

A. At least 25% of the duct shall be tested and shown to have a rate of air leakage (CL) less than or equal to 4.0 as determined by the following equation:

$$CL = F/P^{0.65}$$

Where:

F = The measure leakage rate in CFM per 100 square feet of duct surface
P = The static pressure of the test

3.06 FINAL AIR BALANCE

A. General: When tests have been completed and systems are complete and ready for operation, perform the following steps of final air balance and record the results.

B. Motors: Verify correct rotation of rotating equipment. Verify that properly sized thermal heater elements are installed in starters. Verify that properly sized duel-element fuses, where specified, are installed in disconnect switches.

C. Filters: Check air filters or filter media. Balance system only with clean filters or filter media.

D. Airflow at Each Unit: Read and record return and/or outside air, supply air cfm, and temperature at each fan and blower.

E. Water flow at Each Unit: Set thermostat for full cooling and for full heating loads. Measure and record supply and return water flow at each cooling/heating coil.

F. Coil Temperatures: Set thermostat for full cooling and for full heating loads. Read and record entering and leaving dry bulb and wet bulb temperatures at each cooling and heating coil.

G. Outlet Airflow: Adjust each air exhaust inlet and supply diffuser, register, and grille to within 10% of design air cfm. Dampers in diffusers (if specified) may be used for only 10% adjustment from full open airflow. Include terminal points of air supply and points of exhaust.

H. Surgical Centers: Operating room supply diffusers shall be balanced within 25 to 35 CFM per square foot. Pressure offsets as listed in the drawings shall be maintained.

END OF SECTION 230593

# SECTION 230700 - HVAC INSULATION

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the insulation of HVAC and Plumbing piping, duct, and equipment. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the insulation system specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

### 1.02 QUALITY ASSURANCE

A. Manufacturer: Approved manufacturers are Armstrong, Calsite, Cell-U-Foarm Corp, Ceelco, Certainteed Corp, Dow Chemical Company, Forrest Mfg Co, Foster / Chilers, Gemco, Johns Manville, Knauf Fiberglass, Midwest Fastners, Owens Corning Fiberglass, Pittsburg Corning Fiberglass, Rubatex, Trymer, and Venture Tape.

B. All insulation, jacket and adhesive shall have a fire and smoke hazard ratings as tested under ASTM E 84, NFPA 255, and UL 723 not exceeding:

| | |
|---|---|
| Flame Spread: | 25 |
| Fuel Contributed: | 50 |
| Smoke Developed: | 50 |

Exceptions: Type B Insulation and PVC Fitting Covers

### 1.03 SUBMITTALS

A. Per Section 23 01 00.

B. Product Data
1. Type A Insulation
2. Type B Insulation
3. Type C Insulation
4. Type D Insulation
5. Type E Insulation
6. Type F Insulation
7. Type G Insulation
8. Vinyl Lacquer Paint for Type B Insulation
9. Metal Jacket

1.04 DEFINITIONS

A. The phrase "Storm Drainage Conductor" refers to that portion of the storm drain interior to the building, between the roof drain body and where the pipe goes below grade.

B. The word "plenum" shall mean a ceiling space or mechanical room used for the transfer of conditioned return and/or outside air.

PART 2 - PRODUCTS

2.01 PIPING INSULATION

A. Type A – Fiberglass (indoor)
1. One Piece glass fiber, rigid molded sectional pipe covering with factory applied aluminum foil and white craft paper flame retardant vapor barrier jacket, conforming to ASTM C547, Class II, Mineral Fiber Preformed Pipe Insulation.
2. Thermal Conductivity (k) equals approximately 0.23 (BTU/HR., SF., Degree F, IN) at 75 °F.
3. Similar to Johns Manville Corp "Micro Lox 650 AP T", or approved equal.

B. Type B - Closed Cell (indoor)
1. Closed cell, flexible foamed plastic conforming to ASTM C534, "Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form." Insulation shall be suitable for a temperature range from –40 degrees F to 220 degrees F.
2. Conductivity (k) equals approximately 0.27 (BTUHR., SF., Degree F, IN) at 75 °F.
3. Similar to Armstrong "Armaflex", or approved equal.

C. Type C – Polyisocyanurate (outdoor)
1. Prefabricated 2 lb./cu.ft. density polyisocyanurate insulation with waterproof mastic and glass fiber jacket finished with an aluminum jacket with waterproof silicone caulk joints.
2. Conductivity (k) equals approximately 0.14 (BTUHR., SF., degrees F, IN) at 75 °F.
3. Insulation shall be applied per manufacturer's recommendations. Joint sealants and coatings shall be as approved by the insulation manufacturer for the intended application and service temperature range.
4. Jacketing shall be an all service jacket with 1 mm aluminum foil on pipe insulation and FSK jacket on board stock applied by the manufacturer to ASTMC-1136. Jacket shall have integral flap for sealing joint.
5. Similar to Trymer 9501, or approved equal.

2.02 EQUIPMENT INSULATION

A. Type Dh - Fiberglass Board (Hot Equipment)
1. Semi-rigid intermediate service fibrous glass board for operating temperatures greater than 850 degrees F.

2. Conductivity (k) equals approximately 0.23 (BTU/HR., SF., degrees F, IN) at 75 °F. Minimum density of 4.25 lb / cu ft.
3. Similar to Johns Manville Corp "Spin Glass", or approved equal.

B. Type Dc - Foamed Plastic (Cold Equipment)
1. Foamed plastic sheet suitable for operating temperatures between –40 degrees F and 22- degrees F.
2. Conductivity (k) equals approximately 0.27 (BTU/HR., SF., Degree F, IN) at 75 °F.
3. Similar to Armstrong "Armaflex", or approved equal.

C. Type E
1. Calcium silicate block conforming to ASTM C 553, Type I (1200 degrees F. max), asbestos free.
2. Conductivity (k) equals approximately 0.42 (BTU IN/HR., SF., degree F) per inch thickness at 200 °F.
3. Similar to Calsilite, or approved equal.

2.03 DUCTWORK INSULATION

A. Type F – Duct Wrap
1. Duct insulation shall be 2" thick, minimum 3/4 lb. density fiberglass with an FSKL aluminum foil jacket, reinforced with fiberglass scrim.
2. Conductivity (k) equals approximately 0.24 (BTUHR., SF., degrees F, IN) at 75 °F.
3. Integral UL rated vapor barrier of:
   a. Aluminum foil reinforced with fiberglass scrim laminated to 30-lb. kraft paper.
   b. Class I white vinyl 0.004 inch thick, where specified.
4. Similar to Johns Manville Corp "Microlite", or approved equal.

B. Type G - Duct Liner
1. ASTM C1071, Type II, Grade 2, R-6, 1-1/2" thickness, 1.5 lb. Density for low pressure ductwork and 3.0 lb density for medium pressure ductwork, bonded mat of glass fiber coated with black fire resistant and microbial resistant coating, complying with TIMS AHC 101. Moisture adsorption shall not be greater than 0.5% moisture by volume when exposed to moisture-laden air at 120°F and 96% RH, per ASTM C553. Insulation shall be Schuller "Permacote Linacoustic" R-300, "Aeroflex Ductliner" as manufactured by Owens Corning Fiberglass Corp. or "Ultralite with Certa Edge" by Certainteed Corp. or equal by Knauf Fiberglass.
2. Duct liner adhesive shall comply with ASTM C916 "Specifications for Adhesives for Duct Thermal Insulation".
3. Liner Fasteners: Mechanical or weld secured fasteners for duct liner where finish of duct is not exposed. For exposed ductwork, except in mechanical rooms, provide adhesively secured fasteners. Position fasteners are recommended by SMACNA.

4. Minimum Sound Absorption coefficients shall be:

| | 125 | 250 | 500 | 1000 | 2000 | 4000 |
|---|---|---|---|---|---|---|
| Coefficient | 0.34 | 0.42 | 0.47 | 0.64 | 0.80 | 0.79 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Attenuation* | 3 | 5 | 12 | 24 | 21 | 17 |

* Attenuation in dB per 10 lineal feet, per ASTM E477

2.04 METAL JACKET

A. Smooth aluminum jacket 0.016 inch thick.

B. Integral polykraft or poly-surlyn moisture barrier.

C. Banded locking joints with field applied silicone weatherproof sealant.

D. Similar to Johns Manville Corp, or approved equal.

2.05 INSULATION ACCESSORIES

A. The following accessories shall be used in the application of the thermal insulations specified under this Section:
   1. PVC Fittings Covers: similar to Johns Manville Corp "Zeston", or approved equal.
   2. Pressure Sensitive polyester film tape to secure pipe insulation up to 12" outside diameter: Similar to 3M 30-80, or approved equal.
   3. Vapor Seal Mastic: Similar to Childers CP-35, or approved equal.
   4. Lagging Adhesive: Similar to Childers CP-52, or approved equal.
   5. Wire: 16 gauge soft stainless steel.
   6. Insulation Bonding Adhesive (To Metal): Similar to Childers CP-82, or approved equal.
   7. Insulating and Finishing Cement: Similar to Insulco Smooth Kote, or approved equal.
   8. Mechanical Fasteners - Welded or adhered pins with speed clip washers: Similar to Gemco Midwest Fasteners, or approved equal.
   9. Bands for Equipment:
      a. Outside diameter of insulation is less than 24 inch: 1/2 inch x 0.020-inch (25 ga.) stainless steel.
      b. Where diameter is 36 inches or larger: 3/4 inch x 0.020 inch.
   10. Bands for Piping: 1/2 inch x 0.020-inch stainless steel.
   11. Wire Mesh: 1 inch by 20-gage stainless steel hexagonal wire netting.

PART 3 - EXECUTION

3.01 INSULATION APPLICABILITY

A. Heat Pump loop piping (tempered): No insulation required (except where exposed to freezing temperatures—see exterior piping for condenser water below for this condition).

B. Interior Hot Water, Chilled Water, and Condenser Water - Type A insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1 | up to 1-1/4 |

| | |
|---|---|
| 1-1/2 | 1-1/2 to 3 |
| 2 | 4 and up |

C. Exterior Hot Water, Chilled Water, and Condenser Water – Type C insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1 | up to 2-1/2 |
| 2 | 3 and up |

D. Condensate Drains (except in plenums and fire partitions/floors) – Type B insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| ½ | all |

E. Condensate Drains (inside plenums and fire partitions/floors) – Type A insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1/2 | up to 1 |
| 3/4 | 1-1/4 and up |

F. Horizontal storm leaders, roof drain bodies, and underside of drains receiving condensate from cooling coils – Type F insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 2 | all |

G. Horizontal waste piping from electric water coolers – Type A insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1/2 | all |

H. Refrigerant Suction (and Liquid where required by system and/or manufacturer) Lines & Valves (except in plenums and fire partitions/floors) – Type B

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1 | all |

I. Refrigerant Suction (and Liquid where required by system and/or manufacturer)Lines & Valves (in plenums and fire partitions/floors), and hot gas bypass piping – Type A insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 1 | all |

J. Outdoor cooling tower make-up water – Type C insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 2 | all |

K. Boiler stack, breeching and converter – Type E insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 4 | all |

L. Emergency Generator Exhaust Piping and Muffler – Type E insulation required:

| Insulation Thickness (in) | Pipe Sizes (in) |
|---|---|
| 4 | all |

M. Medium Pressure Supply Ducts – Type F insulation required

| Insulation Thickness (in) | Duct Sizes (in) |
|---|---|
| 2 | all |

N. Low Pressure Supply Ducts – Type F insulation required

| Insulation Thickness (in) | Duct Sizes (in) |
|---|---|
| 2 | all |

O. Outside air ductwork: No insulation required (except when air is pre-cooled below dew point of air surrounding duct).

P. Domestic Water Heaters shall be factory insulated.

Q. Cold equipment – Type Dc insulation required, minimum 1/2". Consult with equipment manufacturer as thickness may vary depending on service application and equipment manufacturer installation recommendations.

R. Hot equipment – Type Dh insulation required, minimum 2". Consult with equipment manufacturer as thickness may vary depending on service application and equipment manufacturer installation recommendations.
Notes:
   a. Exhaust ductwork, stairwell pressurization and dedicated smoke evacuation ductwork is not insulated, unless otherwise noted.
   b. Exposed supply and return ductwork will be double wall, internally lined.
   c. All duct connected to equipment without compressors must be internally lined with Type G duct liner for a distance not less than 5 feet from the equipment connection.
   d. All duct connected to equipment that contains compressors must be internally lined with Type G duct liner for a distance not less than 10 feet from the equipment connection.
   e. The above thicknesses are the minimum required. All local codes and local energy codes shall be complied with.
   f. All piping exposed to outdoors shall be insulated. All piping subject to freezing shall be provided with heat tracing. Coordinate insulation with heat trace cable and controls.
   g. Insulation types and thickness are a minimum standard. Each application shall be carefully considered and insulation product type and thickness

shall be appropriate for each specific application. Submit all insulation products with verification of their service intent.

h. Insulation may be omitted on condenser water piping located within mechanical rooms.

3.02 PIPING INSULATION GENERAL REQUIREMENTS

A. Preparation
1. Do not apply insulation until piping has been leak tested.
2. All surfaces to be insulated shall be dry and free of loose scale, rust, dirt, oil or water.

B. Application:
1. Insulation shall be installed in a smooth, clean workmanlike manner. Joints shall be tight and finished smooth without fish-mouths.
2. Insulation shall fit tightly against the surface to which it is applied to prevent air circulation between the insulation and the pipe or equipment to which it is applied.
3. Insulation applied to cold piping or equipment shall be completely vapor sealed, free of pinholes or other openings.
4. Do not use wet insulation materials.
5. All longitudinal joints on vertical pipe runs shall be staggered.
6. Apply insulation so as to permit expansion or contraction of pipelines without causing damage to insulation or surface finish.
7. Do not apply mastic or adhesive until all previous applications of mastic and adhesives have thoroughly dried.
8. No bands or staples shall be provided on covering.
9. The adhesive used in connection with all covering work shall contain an approved vermin and rodent proof ingredient.
10. Provide 24-gauge sheet-metal saddle between the pipe hanger/support and the exterior of the insulation. Saddle length shall be the same as insulation inserts.

C. Application at Fittings:
1. Insulation of flanges and flanged fittings shall overlap adjacent pipe covering at least 1 inch. Valves shall be insulated up to the gland only.
2. Pipeline strainers shall be insulated in such a manner as to permit removal of strainer basket without disturbing insulation of the strainer body.
3. Insulation adjacent to un-insulated flanges shall be tapered back and neatly finished so as to allow access to and removal of bolts without injury to covering.

3.03 TYPE A INSTALLATION

A. Tightly butt together sections of insulation on pipe runs sealing longitudinal seams of jacket with a self-sealing adhesive. Seal end joints with 4-inch wide straps of matching vapor barrier tape. Seal off ends of insulation with vapor seal mastic at valves, fittings and flanges. No further finish required. Mastic shall extend onto the bare pipe and over the insulation O.D.

B. PVC fitting jackets shall be used when they are available for the particular application. When molded or routed coverings are not available, the coverings

shall be fabricated in the field similar to equipment insulation. Molded or routed fitting covers are highly recommended. Order PVC pre-curled.

C. Cold Piping:
1. Cover valves, fittings and flanges with insulation having the same thickness as adjacent pipe covering, securing in place reforming tape up to 12" O.D. and ½" wide SST bands on larger O.D. Apply a PVC jacket and seal joints with PVC cement (solvent welding).

D. Hot Piping:
1. Covers shall overlap the pipe insulation by the thickness of the insulation or 2" min. Cover valves, fittings and flanges with insulation similar to the adjacent pipe covering, securing in place with reforming tape up to 12" O.D. and ½" wide SST bands on larger O.D. Apply a PVC jacket and tape end joints to adjacent pipe insulation.
2. Do not use PVC fitting jackets where the surface of the insulation is above 150 degrees F.

E. Exterior Piping:
1. Exterior above grade water piping shall be finished with a weatherproof jacket and an aluminum jacket. Lap and seal joints as per manufacturer's instructions. Place laps to shed water.

3.04 TYPE B INSTALLATION

A. Type B insulation shall be slipped on the pipe prior to connection, and the butt joints shall be sealed. Where the slip on technique is not possible, the insulation shall be carefully slit and applied to the pipe.

B. All joints shall be completely butt sealed with the manufacturer's recommended adhesive.

C. Do not apply Type B insulation in multiple layers.

D. Type B insulation shall not be used in plenums nor firewall penetrations.

E. This Contractor shall paint Type B insulation exterior to the building with two coats of a vinyl acrylic paint recommended by the insulation manufacturer for protection against ultraviolet degradation and shall be flexible with no cracking. It is recommended in high humid areas to coat the insulation with a vapor barrier mastic to .037 min. DFT.

3.05 TYPE C INSTALLATION

A. Exterior
1. Butter joints of insulation with non-setting adhesive. Secure with factory applied Self-Seal laps. Installation shall be as per manufacturer's guidelines.
2. Finish shall be factory applied All Service Jackets. All fittings shall be finished with vapor seal mastic reinforced with white glass mesh. Minimum 0.037 thick DFT of mastic.

3. Piping exposed in machine rooms shall be finished with vapor seal mastic and open weave membrane 10 x 10.
4. Piping exposed to weather shall be finished with all service jacket and additional finish of 0.16 thick aluminum jacket. Aluminum jacket shall be secured with stainless bands located on maximum centers of 12 inches and at the overlap. No screws or pop rivets shall be used.
5. Fittings and valves shall be finished with vapor seal mastic, reinforced with minimum 0.037" DFT of mastic, glass mesh and aluminum preformed fitting covers.

3.06 TYPE D AND E INSTALLATION

A. Equipment Insulation Application:
1. Apply insulation to fit as closely as possible to equipment.
2. Stagger joints where possible.
3. Bevel insulation around nameplates, ASME stamp and access plates.
4. Insulation on equipment that must be opened periodically shall be constructed so insulation can be removed and replaced without damage.
5. Do not install Type E insulation on aluminum surfaces or with aluminum jacket.

B. Hot Equipment:
1. Install 3/4-inch expanded metal over equipment with standing ribs or seams prior to applying insulation to eliminate ribs or seams penetrating through the insulation.
2. Secure the insulation with steel bands spaced on 12-inch centers.
3. Where required, use welded studs, clips or angles as anchors for wire or bands on flat surfaces.
4. Seal joints with insulating cement.
5. Over the insulation stretch 1-inch hexagonal mesh wire and lace the edges together.
6. Apply a 1/4-inch thick coat of finishing cement and trowel smooth.
7. Smooth insulation with lagging adhesive, cover with glass cloth and a final coat of lagging adhesive.
8. On small equipment where it is not practical, omit the wire mesh and finishing cement on Type D insulation.

C. Cold Equipment
1. Cover irregular surfaces with a smoothing coat of insulating cement.
2. Secure insulation with wire or with stainless bands spaced on 12-inch centers.
3. Seal joints with vapor seal mastic.
4. Embed a layer of glass into a 1/16-inch coating of vapor seal mastic. Then coat the outside of the glass cloth with a 1/16-inch coating of vapor seal mastic.

D. Roof Drain Bodies
1. Insulate similar to cold equipment.
2. Insulated boxes around roof drain bodies are not acceptable.

3.07 TYPE F INSTALLATION

A. Ductwork Insulation Application:
1. Apply insulation tightly and smoothly to duct.
2. Secure insulation on the bottom of ducts and plenums and on the sides of plenums and other places where the insulation will sag and max 3" from any corner.
3. Impale insulation over pins or anchors located not more than 18 inches apart and hold in place with washers and clips.
4. Cut off protruding pin after clips are secured and seal with 2-mil. aluminum foil backed pressure sensitive tape.
5. Apply insulation with joints tightly butted.
6. Seal all ductwork joints, punctures and fittings with a mastic type sealant containing a vapor barrier.
7. Cover all breaks, joints, punctures and voids with a vapor seal mastic and cover with a vapor barrier material identical to vapor barrier on the insulation, where gaps exceed 2".
8. Bevel insulation around nameplates, access plates and doors.
9. Insulation shall be continuous through walls and floors except at fire dampers.

3.08 TYPE G INSTALLATION

A. Internal Lining Insulation Application:
1. Apply where specified herein.
2. Apply liner in accordance with SMACNA Duct Liner Application Standard, later edition.
3. Provide metal liner for the sound lining. Metal liner to be 24 gauge galvanized sheet metal with perforation of 3/32" diameter holes on 3/16" center. Properly fasten liner to the duct so that liner does not sag or vibrate.

3.09 METAL JACKET INSTALLATION

A. Cover all piping insulation exposed to the exterior with metal jacket as specified herein.

3.10 FLEX DUCT

A. Flexible ductwork runouts to diffusers and grilles shall be wrapped in fiberglass insulation and sheathed in reinforced, metallized polyester jacket. Minimum insulated value of R=6.0.

3.11 HANGERS

A. Continue insulation through pipe hangers. Provide either rigid insulation inserts or sheet metal inserts at all outside pipe hangers. Provide rigid insulation inserts for piping operating below 60 °F. and sheet metal inserts for piping above 60 °F.

B. Provide rigid insulation (on non-insulated piping) or sheet metal inserts (on insulated piping) between the pipe and pipe hanger - shall be of a thickness

equal to the adjoining insulation and shall be provided with vapor barrier where required. Insulation insert shall not be less than the following lengths:

| | |
|---|---|
| 1/2" to 2 1/2" pipe size | 10 Inches Long |
| 3" to 6" pipe size | 12 Inches Long |
| 8" to 10" pipe size | 16 Inches Long |
| 12" and over | 22 Inches Long |

C. Inserts for cold piping shall have a vapor barrier facing of the same material as the adjacent pipe insulation. Seal inserts into insulation with vapor seal mastic.

D. Sheet metal inserts shall be of steel sheet. Gauge shall conform to manufacturer's recommendation for pipe size. Sheet metal inserts shall have insulation filler of the same material as the adjacent pipe insulation.

3.12 PIPE SLEEVES

A. Pipe insulation and vapor barrier shall be continuous through sleeves in walls and floors.

B. Type B insulation shall not be used in sleeves through firewalls or fire rated (2-hour) floor systems. Use Type A or Type C through the sleeve instead and vapor seal the joint between the two insulations.

C. Provide 26 gauge galvanized steel or 0.020 inch aluminum jacket over insulation on pipe passing through sleeves where sealant is required.

D. Where penetrating interior walls, extend the metal jacket 2 inches out either side of the wall and secure each end with a metal band compressing the insulation slightly.

E. Where penetrating floors, extend the metal jacket 2 inches below the floor and 5 inches above the floor. Secure with metal bands.

END OF SECTION 230700

# SECTION 23 23 00 - REFRIGERANT PIPING

## PART 1 – GENERAL

### 1.01 RELATED DOCUMENTS

A. The conditions of the contract and applicable requirements of Division 1, "General Requirements", and Section 23 01 00, "Basic Mechanical Requirements", govern this Section.

### 1.02 DESCRIPTION OF WORK

A. Work Included: Refrigerant piping including suction, liquid, discharge and condenser drain piping between compressors, evaporators, condensers and receivers for direct expansion air conditioning and refrigeration systems.

B. Work of Other Sections: Section 23 05 29, "Hangers & Supports for HVAC Piping & Equipment", Section 23 07 00 , "HVAC Insulation"

### 1.03 QUALITY ASSURANCE

A. Provide piping as described by ANSI B31.5, Refrigeration Piping and ASTM B75, Seamless Copper Tube.

B. Provide fittings as described by ANSI B17.22, Wrought Copper and Bronze Solder-Joint Pressure Fittings and SAE J513F, Refrigeration Tube Fittings.

C. Comply with material and installation requirements of ASHRAE 15, Safety Code for Mechanical Refrigeration.

D. Comply with material and installation requirements of:
1. ARI 710, Liquid-Line Dryers
2. ARI 750, Thermostatic Refrigerant Expansion Valves
3. ARI 730, Flow-Capacity Rating and Application of Suction-Line Filters and Filter Dryers
4. ARI 495, Refrigerant Liquid Receivers
5. ARI 770, Refrigerant Pressure Regulating Valves
6. UL 207, Refrigerant Containing Components and Accessories, Non-electrical

## PART 2 – PRODUCTS

### 2.01 MATERIAL

A. Pipe
1. Seamless Copper Tube, Hard Drawn
   a. All sizes are to be type ACR ASTM B75 or Type K or L ASTM B88

B. Fittings
1. Ells, Tees, Couplings, Caps, Reducers –

a. Wrought copper or wrought bronze with silver soder, ASTM B16.22

2.02 EQUIPMENT

A. Provide refrigerant specialties of sizes, types, ratings and capacities required to comply with installation requirements.

B. Refrigerant Valves:
1. Globe Shutoff Valves:
   a. Cast iron, packed, back seating type with winged seal cap.
   b. 300°F temperature rating, 300 psi working pressure.
2. Check Valves:
   a. Cast iron, accessible internal parts.
   b. 300°F temperature rating, 300 psi working pressure.
3. 2-Way Solenoid Valve:
   a. Forged brass or steel, normally closed, Teflon valve seat.
   b. NEMA 1 solenoid enclosure, 24 volt, 60 Hz., UL-listed, ½" conduit adapter.
   c. 300°F temperature rating, 500 psi working pressure.
   d. Provide manual operator to open valve.

C. Refrigerant Strainers
1. Straight line or angle line type.
2. Brass shell and end connections.
3. 100 mesh, stainless steel screen.
4. UL-listed.
5. 430 psi working pressure.

D. Moisture – Liquid Indicator:
1. Copper plated steel with solder connections.
2. Paper indicator element held under sight glass.
3. UL-listed.
4. Rated working pressure 430 psi..

E. Filter – Dryers (Sealed Core):
1. Steel shell.
2. Molded desiccant core.
3. Solder or flare connections.
4. UL-listed.
5. 500 psi working pressure.

F. Filter – Dryers (Replaceable Core):
1. Steel Shell with bolted end plate.
2. Replaceable molded desiccant core.
3. Solder or pipe connections.
4. UL-listed.
5. 500 psi working pressure.

G. Evaporator Pressure Regulator:
1. Steel body.
2. Pressure operated, adjustable pressure regulator.

3. Solder connections.

H. Thermostatic Expansion Valve:
1. Brass body and stainless steel diaphragm.
2. Externally adjustable.
3. External pressure equalizer.
4. Removable inlet strainer.
5. Flare connections.
6. Strap-on bulb with 5' of tubing.

I. Receiver:
1. Copper shell with brazed points and fusible relief plug.
2. 450 psi working pressure
3. Flare connections.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which refrigerant piping is to be installed.

B. Do not proceed with work until satisfactory conditions are present.

3.02 INSTALLATION OF REFRIGERANT PIPING AND SPECIALTIES

A. Install refrigerant piping in accordance with piping and equipment manufacturer's recommendations.

B. Install refrigerant piping with 1/8" per foot (1%) downward slope in direction of oil return to compressor.

C. Provide oil traps and double risers where required to provide oil return.

D. Clean refrigerant piping by swabbing with dry lint-free cloth, followed by refrigerant oil soaked swab.

E. Remove excess oil by swabbing with cloth soaked in high flash point petroleum solvent, squeezed dry.

F. Bleed dry nitrogen through refrigerant piping during brazing operations.

G. Install refrigerant valves in accordance with manufacturer's instructions.

H. Remove accessible internal parts before soldering or brazing, replace after joints are completed.

I. Install solenoid valves with stem pointing upwards.

J. Install accessories in locations accessible for service.

K. Adjust evaporator pressure regulators, if required, for proper evaporator pressure.

L. Install filter drier cores after leak test but before evacuation.

M. Insulate quantity of lines as required by equipment manufacturer requirements and literature.

3.03 EQUIPMENT CONNECTIONS

A. Connect refrigerant piping to mechanical equipment according to equipment manufacturer's instructions.

3.04 DEHYDRATION AND CHARGING SYSTEM

A. After testing and acceptance of installation, evacuate refrigerant system with vacuum pump until 35°F temperature is reached on vacuum dehydration indicator.

B. During evacuation, apply heat to pockets, elbows, and low spots in piping.

C. Maintain vacuum on system for minimum of 5 hours after closing valve between vacuum pump and system.

D. Break vacuum with refrigerant gas, allow pressure to build up to 2 psi.

E. Complete charging system using new filter dryer core in charging line.

F. Provide full operating charge.

END OF SECTION

# SECTION 233000 - DUCTWORK

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the duct systems. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the duct systems specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

### 1.02 DESCRIPTION OF WORK

A. Work Included:
   1. Provide sheet metal ductwork as specified herein.

B. Types: The types of ductwork specified in this Section include, but are not necessarily limited to the following:
   1. Air conditioning cooling and/or heating supply and return air systems
   2. Outdoor air supply systems
   3. Mechanical exhaust systems
   4. Air relief systems
   5. Kitchen exhaust systems
   6. Boiler breeching and boiler flue

C. Supply Air Ductwork Downstream of Heat Pumps: Ductwork shall be sheet metal designed for velocities up to 1,500 fpm or a friction rate of 0.10 inches water column per 100 feet of duct, whichever is most stringent. The ductwork shall meet the latest SMACNA Standards for construction and stiffening based on the maximum pressure in the ductwork. Ductwork shall be 1" W.C. pressure class.

D. VAV Supply Air Ductwork Upstream of Terminal Units (round or flat oval): Ductwork shall be sheet metal designed for velocities up to 2,800 fpm. The ductwork shall meet the latest SMACNA Standards for construction and stiffening based on the maximum pressure in the ductwork. Ductwork shall be 3" W.C. pressure class.

E. VAV Supply Air Ductwork Upstream of Terminal Units (rectangular): Ductwork shall be sheet metal designed for velocities up to 2,300 fpm. The ductwork shall meet the latest SMACNA Standards for construction and stiffening based on the maximum pressure in the ductwork. Ductwork shall be 3" W.C. pressure class.

F. Supply Air Ductwork Downstream of Terminal Units: Ductwork shall be sheet metal ductwork designed for velocities up to 1,500 fpm or a friction rate of 0.10 inches water column per 100 feet of duct, whichever is most stringent. The ductwork shall

meet the latest SMACNA Standards for construction and stiffening based on the maximum pressure in the ductwork. Ductwork shall be 1" W.C. pressure class.

G. Outside Air Ductwork (fan forced): Ductwork shall be sheet metal ductwork designed for velocities up to 2,500 fpm. The ductwork shall meet the latest SMACNA Standards for construction and stiffening based on the maximum pressure in the ductwork. Ductwork shall be 1" W.C. pressure class.

H. Outside Air Ductwork (passive): Ductwork shall be sheet metal ductwork designed for velocities up to 1,000 fpm. The ductwork shall meet the latest SMACNA Standards for construction and stiffening based on the maximum pressure in the ductwork.

I. Garage Supply and Exhaust Ductwork: Ductwork shall be sheet metal ductwork designed for velocities up to 2,500 fpm. The ductwork shall meet the latest SMACNA Standards for construction and stiffening based on the maximum pressure in the ductwork.

J. Stairwell Pressurization Ductwork: Ductwork shall be sheet metal ductwork designed for velocities up to 3,000 fpm. The ductwork shall meet the latest SMACNA Standards for construction and stiffening based on the maximum pressure in the ductwork.

K. Restroom and General Exhaust Ductwork: Ductwork shall be sheet metal ductwork designed for velocities up to 1,500 fpm. The ductwork shall meet the latest SMACNA Standards for construction and stiffening based on the maximum pressure in the ductwork. Ductwork shall be 1" W.C. pressure class.

L. Smoke Exhaust and Relief Air Ductwork: Ductwork shall be sheet metal ductwork designed for velocities up to 3,000 fpm. The ductwork shall meet the latest SMACNA Standards for construction and stiffening based on the maximum pressure in the ductwork. Ductwork shall be rated for the temperature ranges of the fire as required by the local authority having jurisdiction.

M. Grease exhaust ductwork shall be designed for velocities up to 2,500 FPM. The ductwork shall meet the latest SMACNA standards for construction and stiffening based on the maximum pressure in the ductwork. Grease exhaust duct material and installation shall meet the requirements of NFPA 96 and shall be either 16 GA black carbon steel or 18 GA stainless steel, sloping at a minimum of ¼" / foot back toward the hood. All grease exhaust duct shall be welded and leak-tested. Cleanouts should be provided at least every 12 feet and at each change in direction.

N. Flexible Ductwork: Ductwork connections to HVAC terminal units and air devices shall be made with flexible ductwork connection where shown on the Drawings. Additional connections may be made using flexible ductwork at the Contractors opinion, where approved in writing, in advance, by the Engineer. Insulated value of Flexible duct shall be R-6 or greater.

O. Breeching and Flue: Breeching and flue for [boilers] [and] [water heaters] shall be Type "B" flue. [Breeching and flue shall be insulated as specified in Section 23 07 00.]

P. Ductwork Insulation: Refer to section 23 07 00, "HVAC Insulation", for duct insulation.

Q. Ductwork Accessories: Refer to Section 23 33 00, "Ductwork Accessories", for accessories and specialties related to ductwork systems and installation.

1.03 QUALITY ASSURANCE

A. Design and Installation Standards:
1. SMACNA HVAC Duct Construction Standards, latest edition.
2. ASHRAE Standards: Comply with American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE 70-72) , Method of Testing for Rating the air flow performance of outlets and inlets.
3. ADC Standard 1062R2, Air Diffusing Equipment Test Code.
4. AMCA Standard 210, Test Code for Air Moving Devices.
5. NFPA 90-A, Standard for the Installation of Air Conditioning and Ventilating Systems, 2002 edition.

B. Fire and Smoke Rating Test Standards: ASTM E84, NFPA 255 and UL 723.

1.04 SUBMITTALS

A. Shop Drawings: Submit dimensioned layouts of ductwork showing both the accurately scaled ductwork and its relation to space enclosure. Show modifications of indicated requirements, made to conform to local shop practice and how those modifications ensure that the free area, materials, and weights are not reduced. The shop drawings must be submitted at ¼" = 1'-0" or larger scale and shall include all equipment connected to the duct systems, drawn to scale, based on the equipment submittals. All ductwork and equipment must indicate bottom elevations, referenced to finished floor below (bottom of duct = X'-Y" AFF, e.g.)

PART 2 - PRODUCTS

2.01 DUCTWORK MATERIALS

A. Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, oil canning, stains, discolorations, and other imperfections, including those which would impair painting.

B. Gauges, Rectangular Ductwork: Fabricate galvanized steel ductwork from the minimum gauges for sizes up to the corresponding maximum long-side dimensions as indicated in SMACNA Duct Construction Standards.

C. Gauges, Round Ductwork: Fabricate lock-form quality galvanized steel ductwork from the minimum gauges for diameters up to the corresponding maximum dimensions as indicated in SMACNA Duct Construction Standards.

D. Fiberglass Duct board: Fiberglass duct board is NOT an acceptable means of air transport.

2.02 MISCELLANEOUS DUCT MATERIALS

A. General: Provide miscellaneous materials and products of the types and sizes indicated and where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

B. Duct Sealant: Provide non-hardening, non-migrating mastic or liquid elastic sealant (type applicable for the fabrication/installation detail) as compounded and recommended by the manufacturer specifically for sealing joints and seams in ductwork.

C. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim, and angles for support of ductwork.

D. Duct Liner Adhesive: Comply with ASC-A-7001 by The Adhesive and Sealant Council, Inc. (per SMACNA standards).

E. Duct Liner Fasteners: Comply with SMACNA.

F. Flexible Ductwork: Insulated flexible ductwork shall be Atco Type UPC #036 or UPC #031. Approved equal flexible ductwork by Certainteed Corporation, Flexaust Company, Genflex or Owens-Corning Fiberglass will be acceptable. Provide either 45 degree angle taps with manual volume dampers or "spin-in" taps with manual volume dampers at main duct tap as shown on Drawings. Provide with a minimum R-Value of 6.0 or R-Value of 8.0 when installed in unconditioned spaces.

2.03 BOILER FLUE AND BREECHING

A. Flues: Flues for boilers shall comply with NFPA requirements for Type "A" boiler flue. A UL factory-fabricated stack rated for such duty may be used or a stack fabricated of not less than 16 gauge steel, welded and insulated as specified under Section 23 07 00, "System Insulation", of these Specifications, including terminal caps may be used.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Standards: Round and rectangular sheet metal ductwork shall be constructed in accordance with SMACNA "HVAC Duct Constructions Standards", latest Edition, ASHRAE Guide and Data Book, "Handbook of Fundamentals", latest edition, specifically Chapter 25 and NFPA Standard 90-A, "Standard for the Installation of Air Conditioning and Ventilating Systems".

B. All ductwork required for the heating, ventilating and air conditioning systems shall be constructed and erected in a first class workmanlike manner. This work

shall be guaranteed for a period of one year from and after the date of acceptance of the job against noise, chatter, whistling, vibration, and free from pulsation under all conditions of operation.

C. The interior surface of all ductwork shall be smooth with no parts projecting into the air stream unless specified to do so. All seams and joints shall be external. The inside of all ductwork shall be thoroughly cleaned and all fans operated to remove any debris prior to connection of air devices.

D. All holes in ducts for damper rods and other necessary devices shall be either drilled or machine punched (not pin punched), and shall not be any larger than necessary. All duct openings shall be provided with sheet metal caps if the openings are to be left unconnected for any length of time.

E. Where ducts, exposed to view (including equipment rooms), pass through walls, floors or ceilings, furnish and install sheet metal collars around the duct.

F. Sheet metal plenums shall be constructed and reinforced in accordance with SMACNA standards. Where plenums are connected to louvers, the plenum bottom shall be sloped to drain to the louver.

G. Ductwork which is exposed to weather shall have soldered joints and seams and shall be painted with a suitable epoxy coating. In lieu of solder joints, the use of duct-mate or TDC manufactured flanges are acceptable.

3.02 COORDINATION

A. Prior to submitting ductwork shop drawings, the Division 23 Contractor shall fully coordinate the routing and height of all ductwork with all other trades and with ceiling heights, lighting fixtures and building construction.

3.03 GENERAL DUCTWORK FABRICATION

A. Duct Gauge and Reinforcing:
1. Rectangular Ductwork: Minimum metal gauges and reinforcement shall be in accordance with SMACNA HVAC Duct Construction Standards (SDCS) Tables 1-3 through 1-13. Minimum aluminum gauges and reinforcement shall be in accordance with SDCS Tables 1-14 through 1-16. Reinforcing shall be installed per SDCS Fig. 1-9 through 1-12.
2. Round Ductwork: Minimum metal gauges for longitudinal and spiral seam round ductwork shall be in accordance with SDCS Table 3-2. Minimum aluminum gauges for longitudinal and spiral seam round ductwork shall be in accordance with SDCS Table 3-3. Longitudinal seam ductwork larger than 12" diameter shall not be permitted unless welded seams are used.
3. Cross-breaking: Cross-break or transverse bead all flat surfaces which are more than 12" wide. Transverse beading shall be on 12" centers and shall be a minimum of 1/8" deep at the center of the bead and 3/8" wide at the base of the bead.
4. Minimum Gauges: The metal gauges listed in the SDCS for round and rectangular ductwork are the minimum recommended. It shall be the

Contractor's responsibility to select a metal gauge heavy enough to withstand the physical abuse of installation.

B. Duct Joints And Seams:
   1. General: Make all joints airtight. The distance between transverse joints on any size duct shall not exceed 5'.
   2. Rectangular Ductwork: Transverse joints and longitudinal seams in ductwork shall be constructed in accordance with SDCS Fig. 1-4 and 1-5. Drive slips may be used on rectangular ductwork on short sides only, up to 18" maximum. Gauge of drive slips shall be at least as heavy as ductwork on which they are installed. Bend drive slips over at least 3/4" at corners. Corner closures shall be in accordance with SDCS Fig. 1-13 through 1-18. All longitudinal seams shall be "Pittsburgh Lock" or button punch snap lock at corner seams and grooved seam or seam welded in sides between corners, in accordance with SDCS Fig. 1-5. At the Contractor's option, transverse joints may be transverse duct flange joints or Ductmate EP12/11 prefabricated galvanized "Ductmate" sections. The proposed gasket material, flange, corner piece and Ductmate details shall be submitted for approval.
   3. Round Ductwork: Transverse joints for round ductwork shall be beaded sleeve type constructed in accordance with SDCS Fig. 3-2, properly secured and sealed. Draw bands shall not be used on round ductwork. Longitudinal and spiral seams shall be constructed in accordance with SDCS Fig. 3-1.
   4. Ductwork Sealing: Seal all longitudinal and transverse ductwork joints and seams using SMACNA ductwork sealant to provide positive seal.

C. Connections and Take-offs:
   1. Rectangular Ductwork: Parallel flow branches shall be constructed using radius elbow take-offs in accordance with SDCS Fig. 2-7. Branch duct connections shall be 45 degree entry expanded taps constructed in accordance with SDCS Fig. 2-8. Duct-mounted coil connections shall be constructed in accordance with SDCS Fig. 2-11.
   2. Round Ductwork: Connections and takeoffs shall be made using 90 degree conical taps, 45 degree lateral taps or wye fittings constructed in accordance with SDCS Fig. 3-4 and 3-5. Use of 90 degree tees shall not be allowed.
   3. Spin-in Fittings: Spin-in fittings may be used for duct taps to air supply and exhaust devices and shall include quadrant dampers even though a volume damper may be specified for the air device. Spin-in fittings shall be sealed at the duct tap with a gasket and compression fit or sealed with duct sealant. The location of spin-in fittings in the ducts shall be determined after terminal units are hung and the location of the light fixtures is known so as to minimize flexible duct lengths and sharp bends. Spin-ins shall be installed with their damper axis parallel to airflow. A minimum of 18" must be provided between fittings.
   4. Flexible Joints In Ductwork: Provide flexible connections where ductwork connects to air-handling units, fans, and similar powered equipment items and where required for expansion and contraction of the ductwork or the building structure. A minimum of one inch (1") slack shall be provided in all flexible connection to insure vibration isolation. Flexible joints are not

required where equipment is connected with flexible duct. Flexible connections shall be rigidly connected to metal work on each side and shall be airtight. Bond flanges of flexible duct connectors to ducts and housings to provide airtight connections. Seal seams and penetrations to prevent air leakage.

D. Elbows and Tees:
   1. Rectangular Ductwork: Provide radius or square elbows in ductwork, where shown on the Drawings. Where radius elbows are shown, radius elbows must be provided. Where square elbows are shown, square or radius elbows may be provided, at the Contractor's option. Elbows shall be constructed in accordance with SDCS Fig. 2-2. Turning vanes are required in all square elbows of 46 degrees or greater angle. Turning vanes are not required in radius elbows. Turning vanes shall be single vane type without a trailing edge and shall be constructed and installed in accordance with SDCS Fig. 2-3 and 2-4.
   2. Round Ductwork: Provide radius elbows of the stamped or segmented type constructed in accordance with SDCS Fig. 3-3. Segmented elbows shall have a minimum of three segments for 45 degree elbows and five segments for 90 degree elbows.

E. Offsets and Transitions: Where duct width increases, maximum angle of slope shall be 20 degrees (one inch (1") in 2.7"). Where duct width decreases, maximum angle of slope shall be 30 degrees (one inch (1") in 1.7"). Offsets and transitions shall be constructed in accordance with SDCS Fig. 2-9 and 2-10.

F. Air Device Connections: Make connections to air devices and fabricate air device plenums as detailed on the Drawings and in accordance with SDCS Fig. 2-16 through 2-18.

3.04. DUCTLINER

A. General: The liner shall be applied to the inside of the duct with heavy density side to the air stream and shall be secured in the duct with adhesive, completely coating the clean sheet metal. All joints in the insulation shall be "buttered" and firmly butted tightly to the adjoining liner using fireproof adhesive. Where a cut is made for duct taps, etc., the raw edge shall be accurately and evenly cut and shall be thoroughly coated with fireproof adhesive. On ducts over 24" in width or depth, the liner shall be further secured with mechanical fasteners. The fasteners shall be A.J. Gerrard Company pronged straps, or approved equal, secured to the ducts by fireproof adhesive. The clips shall be 18" maximum spacing and shall be pointed up with fireproof adhesive. Liner shall be accurately cut and ends thoroughly coated with fireproof adhesive so that when the duct section is installed, the liner shall make a firmly butted and tightly sealed joint. Where ducts are lined exterior insulation will not be needed unless otherwise noted, except that the two insulations shall lap not less than 24". Ductliner for velocities over 2,000 fpm shall be as specified except a perforated metal liner shall be used over ductliner for securement, in lieu of fasteners. Ductliner installation and fasteners shall comply with SDCS Fig. 2-22 through 2-25.

3.05 DUCTWORK INSTALLATION

A. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve airtight and noiseless systems, capable of performing each indicated service. Install each run with a minimum of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers, and anchors of the type which will hold ducts true-to-shape and prevent buckling. System leakage shall be the lesser of SMACNA Class B leakage calculation or 5% of total system CFM.

B. Inserts: Install concrete inserts for support of ductwork in coordination with formwork, as required to avoid delays in the work.

C. Completion: Complete fabrication of work at the project as necessary to match shop-fabricated work and accommodate installation requirements.

D. Run Location: Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, grams, details, and notations or, if not otherwise indicated, run ductwork in the shortest route which does not obstruct usable space or block access for servicing the building and its equipment.

Hold ducts close to walls, overhead construction, columns, and other structural and permanent-enclosure elements of the building. Limit clearance to 0.5" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork to assure 1.0" clearance of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate the layout with suspended ceiling and lighting layouts and similar finished work.

E. Coordination: Coordinate duct installation with installation of accessories, dampers, coil frames, equipment, controls, and other associated work of the ductwork system.

F. Hangers and Supports:
1. General: All ductwork supports shall be per Section IV of the SMACNA "HVAC Duct Construction Standards - First Edition" with all supports directly anchored to the building structure. Supports shall be on maximum 8'-0" centers with additional supports as required to prevent sagging.
2. Attachment to Structure: Provide hanger attachment to the building structure as specified in Section 15100, "Basic Materials and Methods", and in accordance with SDCS Fig. 4-1 through 4-3.
3. Hangers: Hangers shall be strap or rod sized in accordance with SDCS Table 4-1 and 4-2. Strap hanger attachment to rectangular duct shall consist of a turning strap under the duct a minimum of one inch (1") and securing the strap with one screw into the bottom of the duct and one screw to the side of the duct. Rectangular duct supported on trapeze hangers shall be attached to the trapeze. Round duct attachments shall be constructed in accordance with SDCS Fig. 4-4.

4. Horizontal Ducts: Ducts larger than 50" in their greatest dimension shall be supported by means of hanger rods bolted to angle iron or half round trapeze hangers. Duct shall have at least one pair of supports 8'-0" on centers according to the following:

| Angle Length | Angle | Rod Diameter |
|---|---|---|
| 4'-0" | 1-1/2" x 1-1/2" x 1/8" | 1/4" |
| 6'-0" | 1-1/2" x 1-1/2" x 1/8" | 1/4" |
| 8'-0" | 2" x 2" x 1/8" | 5/16" |
| 10'-0" | 3" x 3" x 1/8" | 3/8" |

5. Vertical Ducts: Ducts shall be supported where they pass through the floor lines with 1-1/2" x 1-1/2" x 1/4" angles for ducts up to 60". Above 60", the angles must be increased in strength and sized on an individual basis considering space requirements.

G. Flexible Ductwork:
1. General: Flexible ductwork shall be provided as shown on Drawings. Flexible ducts shall be installed in a fully extended condition free of sags and kinks, using only the minimum length required to make the connection, subject to the maximum lengths herein and below. Bends in any length of flexible duct shall not exceed 45 degrees for HVAC terminal unit connections or 135 degrees for air device connections and shall not exceed that recommended by the flexible ductwork manufacturer. Unless otherwise shown on the Drawings, the length of any one run of flexible ductwork shall not exceed 2 feet to terminal units or 6 feet to air devices.
2. Supports: Where flexible duct extension exceeds 48", horizontally, a support shall be provided. Duct shall be suspended on 48" centers with a minimum two inch (2") wide flat banding material. Refer to SDCS Fig. 3-9 and 3-10 and Page 3-17 for additional requirements.
3. Terminal Unit Flexible Duct Connections: The terminal ends of the duct core shall be secured by stainless steel worm gear type clamps. The fittings on terminal units and on sheet metal duct shall be coated with sealant, then the flexible duct core slipped over duct and the clamp tightened, and the connections shall be sealed with duct sealant. Insulation of flexible duct shall be slipped over connection to point where insulation abuts terminal unit or insulation on duct and attached with self-locking nylon straps. The insulation connections shall then be sealed using foil duct tape to provide vapor barrier. Refer to SDCS Page 3-13 and 3-15 for additional requirements.
4. Air Device Flexible Duct Connections: All joints and connections shall be made by turning back the insulation and securing the inner liner with self-locking nylon straps and sealing with two wraps of duct tape. The insulation shall then be placed over the joint, attached with a self-locking nylon strap and sealed on the exterior with an approved foil duct tape. Refer to SDCS Page 3-13 and 3-15 for additional requirements.

H. Duct Mounted Devices:
1. Install duct mounted sensors and control devices furnished under Section 23 09 00, "Building Controls". Provide access doors at each duct mounted control device. Coordinate location of devices and installation requirements with the Section 23 09 00Contractor.

2. Install duct type smoke detectors furnished under Division 26. Provide access doors at each sampling tube assembly. Coordinate location of detectors and installation requirements with Division 26.
3. Provide duct test ports in ductwork as required to properly balance all air systems. Test ports shall be located per ANSI/ASHRAE Standard III to allow accurate pitot-tube traverse measurements in ductwork.

3.06 FLUE AND BREECHING

A. General: Install flues and breeching in accordance with the flue manufacturer's recommendations and in accordance with SDCS Fig. 2-20.

3.07 CLEANING AND PROTECTION

A. General: Clean ductwork internally, section-by-section of dust and debris as it is installed. Clean external surfaces of foreign substances which might cause corrosive deterioration of the metal or, where ductwork is to be painted, might interfere with painting or cause paint damage.

B. Repairs: Strip protective paper from stainless ductwork surfaces and repair finish or replace ductwork portion wherever it has been damaged.

C. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at the time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent the entrance of dust and debris until such time that connections are to be completed.

END OF SECTION 233000

# SECTION 233300 - DUCTWORK ACCESSORIES

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the ductwork accesories. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the duct systems specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

### 1.02 DESCRIPTION OF WORK

A. Work Included: Provide ductwork accessories as required for the project including the following:
1. Extractors,
2. Turning vanes,
3. Monitors,
4. Splitter dampers,
5. Access doors,
6. Straightening grids
7. Fire dampers.

### 1.03 QUALITY ASSURANCE

A. SMACNA Compliance: Comply with applicable portions of Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) Duct Construction Standards (latest edition).

B. ASHRAE Standards: Comply with American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) recommendations pertaining to construction of ductwork accessories.

### 1.04 SUBMITTALS

A. Shop Drawings: Show modifications of indicated requirements, if applicable, made to conform to local shop practice and show how these modifications ensure that the materials and weights are not reduced and that the fabricated units are equivalent to the specified requirements in every significant way.

## PART 2 - PRODUCTS

### 2.01 DUCTWORK ACCESSORIES, FABRICATION AND MATERIALS

A. General: Provide ductwork accessories that comply with the Section 23 30 00, "Ductwork", and other applicable product requirements of ductwork materials noted in this Section.

2.02 FLEXIBLE CONNECTIONS

A. General: Flexible connections shall be UL-labeled, 30 ounces glass fabric-lined with insulation and coated on both sides with neoprene, complete with attachment accessories, "Vent-Glass" by Vent-Fabrics, Inc. or approved equal.

2.03 DUCTWORK HARDWARE

A. General: Damper operators for concealed inaccessible ductwork shall be Young Regulator Company, Catalog No. 700 or No. 315, as shown. Non-insulated accessible ductwork shall be Young Regulator Company, Catalog No. 433. Accessible insulated ductwork shall be Young Regulator Company, Catalog No. 443. Approved equal units by Duo-Dyne or Vent Fabrics, Inc. will be acceptable.

2.04 DIRECTIONAL, VOLUME CONTROL, AND FIRE DAMPERS

A. General: Provide all direction and volume control and fire dampers shown or noted on Drawings. All damper control devices shall be installed so as to be fully concealed in finished rooms and spaces.

B. Dampers:
1. Splitter Dampers: Splitter dampers shall be not less than 16 gauge. Splitter dampers shall be 1-1/2 times the width of narrowest duct leaving split, except not less than 12" long and shall have not more than 1/4" less height than duct in which it is installed. Splitter dampers having area less than 2.25 square feet shall be adjusted by means of a locking quadrant mounted on end of shaft. Splitter dampers having larger area shall be adjusted by means of one or more push rods in accordance with Figure 2-5, SMACNA "Low Velocity Duct Construction Standards".
2. Extractors: Provide extractors of the size and type required, with hex-key operated adjustable blades, and with gang operated galvanized steel blades on one-inch centers.
3. Taps: Where rectangular take-offs of branches from main ducts are used with 45 degree entry, provide manual volume regulators with lockable operators and nylon bushings on both sides of damper blade rod. Manual volume damper shall have standoff when duct system type is insulated.
4. Round Taps: Where taps to main ducts or their branches are made, provide 45 degree angle taps or 90 degree spin-in taps with manual volume dampers with nylon bushings on both sides of damper blade rod. Manual volume damper shall have standoff when duct system type is insulated.
5. Multi-leaf Dampers: Where multi-leaf dampers are required, provide opposed blade-type in accordance with Figure 2-12, SMACNA "Low Velocity Duct Construction Standards".

C. Fire Dampers: Provide fire dampers at duct penetrations of floors, smoke partitions, fire walls, and where required by the applicable building codes or

authority having jurisdiction. Fire dampers shall comply with state and local codes, be inspected and approved by an approved inspection agency and be labeled at the factory in accordance with Uniform Building Code Standard 43, Section 43.714.

1. Provide one-hour rated dampers where penetrations are in required one-hour fire rated assemblies.
2. Provide 1-1/2 hour rated dampers where penetrations are in required 2-hour fire rated assemblies.
3. Provide 3 hour rated dampers where penetrations are in required 4-hour fire rated assemblies; 4-hour occupancy separating walls are accepted.
4. Fire Dampers shall be type 'B' with shutter located outside of the airstream unless otherwise noted or detailed.

D. Fire Smoke Dampers: Provide fire smoke dampers at duct penetrations of floors, smoke partitions, shaft walls and where required by the applicable building codes. Fire smoke dampers shall comply with state codes, be inspected and approved by an approved inspection agency and be labeled at the factory in accordance with UL 555S.

1. Provide one-hour rated dampers where penetrations are in required one-hour fire smoke rated assemblies.
2. Provide 1-1/2 hour rated dampers where penetrations are in required 2-hour fire smoke rated assemblies.
3. Provide fire smoke dampers with duct mounted smoke detector located within 5' of the damper and wired to fire alarm.
4. Coordinate damper power with fire alarm Construction Professional.
5. Fire smoke dampers shall be provided with rated access doors/panels for review and inspection of dampers.

2.05 FLASHING AND COUNTER-FLASHING

A. General: Flashing and counter-flashing shall be as specified in other Divisions of these Specifications.

2.06 DUCT ACCESS DOORS

A. General: Provide hinged duct access doors, gasketed and with insulation where ductwork is indicated to be insulated. Provide construction per SMACNA Standards. Access doors shall be at least 15" x 15".

B. Inspection Plates: Provide inspection plates as required. Provide a minimum opening of 4" x 4" with a 6" x 6" cover plate. The cover plate shall be one gauge heavier than the ductwork, gasketed and secured with a minimum of eight sheetmetal screws.

2.07 MISCELLANEOUS DUCTWORK MATERIALS

A. General: Provide miscellaneous materials for ductwork accessories, including hinges, refrigerator latches, sash locks, bolts and wing nuts, gaskets and pitot tubes as recommended by the ductwork accessories manufacturer for the application indicated.

2.08 TURNING VANES

A. Construct turning vanes in accordance with SMACNA Standards (current edition).

PART 3 - EXECUTION

3.01 INSTALLATION

A. Access Doors: Install access doors so that the doors open against the system air pressure wherever feasible and that their latches are operable from either side, except where the duct is too small to be entered. Provide access to each fire damper link to permit resetting. Comply with the applicable building codes or authority having jurisdiction and NFPA 96.

B. Inspection Plates: Install plates at each primary zone damper and where otherwise required for inspection of operable mechanisms within the duct systems.

C. Multileaf Dampers: Install multileaf volume dampers in each zone duct of multizone units and as otherwise required for balancing.

D. Splitter Dampers: Install splitter dampers at all divisions of ductwork for proper air pattern control.

E. Turning Vanes:
1. Install turning vanes for all rectangular mitered elbows. Install turning vanes in accordance with SMACNA Standards.
2. Turning vanes for Ducts with air velocity less than 2500 FPM: Use single wall type vanes for ducts having width equal to or less than 12 inches.
3. Use double wall type vanes for (2" radius, 2–1/8" spacing) for ducts having widths greater than 12 inches.
4. If duct sizes change in a mitered elbow, use single wall type vanes with a trailing edge extension.
5. Turing vanes for Ducts with air velocity greater than 2500 FPM: Use double wall type vanes (4-1/2" radius, 3-1/4" spacing).

3.02 TESTING

A. General: Check installed ductwork accessories for required operation and leak-proof performance during the system's operational test. Repair or replace faulty accessories, as required to obtain proper operation and leak-proof performance.

END OF SECTION 233300

# SECTION 233400 - FANS AND HOODS

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the fan and hood systems. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the fan and hood systems specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

### 1.02 DESCRIPTION OF WORK

A. Work Included: Provide U.L. listed fans and ventilators as required by code and as specified.

### 1.03 QUALITY ASSURANCE

A. Basis of design is Greenheck. Other acceptable manufacturers are ACME, Broan, Buffalo, Carnes, Cook, Penn, and Woods.

## PART 2 - PRODUCTS

### 2.01 PRODUCT REQUIREMENTS

A. Ratings: Fans shall be licensed to bear the AMCA certified ratings seal. Ratings of fans shall be based on 70°F and 29.92" of Hg atmospheric pressure. Air handling equipment shall be sized in conformance with applicable codes and good engineering practice. Roof-mounted units shall be located in coordination with the Architect to ensure proper sight lines.

B. Construction: Fan construction shall be in accordance with AMCA classes of construction for the intended duty. Fan wheels, shafts, and drives shall be statically and dynamically balanced at the factory as a unit. Balance reports shall be factory-certified to the Construction Manger.

C. Drives: Provide drives with a minimum belt horsepower capacity of 120% of the motor nameplate horsepower.

D. Motor Sheaves: Motor sheaves shall be Browning Type, MVP, or approved equal, adjustable type with double-locking feature. Motor sheaves shall be selected for the rated fan rpm and shall be adjustable to as close as 10% above and below the rated fan speed.

E. Fan Sheaves: Provide adjustable or nonadjustable sheaves with removable machined bushings. Sheaves shall be machined on surfaces. Sheaves with over three grooves shall be dynamically balanced and the manufacturer shall so designate on each sheave. Fan sheaves with three grooves or less shall be statically balanced and weights required for balancing shall be welded to the sheaves. Manufacturers shall be Browning, Eaton, Yale, Towne, Dodge Manufacturing Company, or Fort Worth Steel and Machinery Company.

F. Belts: Provide standard "V-groove" belts suitable for the service intended with the required capacities. The belts shall be closely matched and tagged prior to delivery to the job site. If the belts do not appear to be properly matched during operation, they shall be rechecked and, if necessary, replaced. Belts shall be as manufactured by Gates, Durkee-Atwood, Goodyear, Browning, or Uniroyal.

G. Bearings: Provide SKF, Sealmaster, Timken, or Fafnir externally or internally-mounted, grease-lubricated, self-aligning ball bearings. Bearings shall have grease type zerk fittings.

H. Motor Mount: Motors shall be mounted on an adjustable base rigidly supported on the fan and shall have extended shaft to accommodate the adjustable pitch sheave.

2.02 CEILING EXHAUST FANS

A. General: Provide direct driven ceiling exhaust fans as required. Fan shall be acoustically insulated and have a maximum sound level rating as scheduled.

B. Motor: Motor shall be suitably grounded and mounted on rubber-in-shear vibration isolators and speeds shall not exceed that scheduled.

C. Accessories:
1. Provide totally noise-free, integral back draft damper, with no metal to metal contact.
2. Inlet grille shall be white molded plastic with egg-crate or perforated shape and provide 85% free open area.
3. Provide terminal box on the housing with cord, plug, and receptacle inside the housing.

PART 3 - EXECUTION

3.01 VENTILATION AND EXHAUST FANS

A. General: Ventilating and exhaust fans not having integral vibration isolation shall be mounted on or suspended by vibration isolators as specified under Section 23 05 48. Where ductwork is connected to fans, Contractor shall provide UL labeled flexible duct connections.

B. Curbs: Factory-fabricated roof curbs, caps, and similar items, shall be supplied and installed by Mechanical Contractor. Coordinate installation with Roofing Contractor.

3.02 SYSTEMS

A. Refer to Section 23 05 53, "Mechanical Identification" for applicable painting, nameplate, and labeling requirements.

B. Placement of fans and noise levels generated by the fans shall be taken into consideration. Refer to specification 23 34 00 for additional information.

END OF SECTION 233400

# SECTION 233700 - REGISTERS, GRILLES, AND DIFFUSERS

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the registers, grilles, and diffusers. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the registers, grilles, and diffusers specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

### 1.02 DESCRIPTION OF WORK

A. Work Included: Provide air outlets and inlets as required for the finished or non-tenant areas of the project including the following:
1. Ceiling air registers, grilles, diffusers
2. Wall mounted registers and grilles
3. Linear lay-in slot diffusers
4. Architectural linear diffusers

### 1.03 QUALITY ASSURANCE

A. Basis of design is Titus. Other acceptable manufacturers are Krueger, Anemostat, Carnes, Metal Aire, Price, Nailor or Tuttle & Bailey.

B. NFPA Compliance: Comply with NFPA 90, as applicable to air diffuser construction and installation.

C. Air Distribution Equipment: Maximum space temperature variation shall not exceed 2°F through the conditioned area from 2' above the floor to 7' above the floor. The air outlets shall be selected by the manufacturer to suit the volume, throw, and noise level criteria described in these Specifications, and maintain maximum terminal velocities of 50 fpm, unless otherwise indicated.

## PART 2 - PRODUCTS

### 2.01 AIR OUTLETS AND INLETS

A. General: Provide air outlets and inlets of the size, shape, and type, constructed of materials and components, and with finishes as required. Apply corrosion resistant treatment to surfaces prior to applying prime coat.

B. Ceiling Diffusers: Provide diffusers with corrosion resistant treated surfaces and finished in baked enamel unless otherwise required. Where applicable, provide adapters with diffusers to permit connection to round supply duct.

C. Registers and Grilles:
   1. General: Provide registers that contain a key-operated multi-louvered opposed blade damper operable from the face side.
   2. Supply Air Register: Provide supply air registers of the double deflection type.
   3. Return Air Grilles and Return Air Registers: Provide grilles and registers as required.

D. Supply Linear Diffuser:
   1. Provide supply linear diffuser with length and width as required. The supply diffuser shall be installed above the ceiling and located as indicated on the Architectural and Mechanical Drawings.
   2. The diffuser shall be designed, tested, and constructed in a manner so as to comply with the performance criteria and sound level requirements specified elsewhere in these Specifications. Plenum shall be constructed of at least 24 gauge galvanized steel and shall be reinforced as required. The air volume, length and duct connection size shall be as required. Coordinate the attachment, support, and similar features of the supply plenum with the ceiling Subcontractor.
   3. The plenum shall be painted flat black on interior surfaces and the exposed surfaces as viewed from below the ceiling system shall be painted flat black.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install air outlets and inlets in accordance with manufacturer's written instructions and recognized industry practices to ensure that products serve intended functions.

B. Duct Connection to Diffuser:
   1. Where flexible duct is connected to ceiling diffusers, the contractor shall use one of these three methods:
      a. Insulated flexible duct with Titus FlexRight flexible duct support, UL listed, to form duct elbow.
      b. A sheet metal elbow, externally insulated.
      c. Insulated flexible metal duct consisting of flexible metal core of corrugated aluminum with external insulation.
   2. In all cases duct connection/elbow shall be made with a bend that has not less than one duct diameter centerline radial.

C. Coordination: Coordinate with other trades, including ductwork, and ductwork accessories, as necessary to interface air outlets and inlets properly with other work.

3.02 FIELD CONTROL QUALITY CONTROL

A. Test installed devices to demonstrate satisfactory compliance with specified and indicated requirements.

END OF SECTION 233700

# SECTION 237400 - PACKAGED DX CONSTANT VOLUME ROOFTOP UNITS

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the rooftop unit system. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the roof top units specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

### 1.02 DESCRIPTION OF WORK

A. Work Included: Provide roof top constant air volume air-conditioning system, complete with controls and accessories as specified. Roof curbs are furnished under this section. Coordinate installation of curbs with Roofing Contractor.

B. Units shall be self-contained, rooftop curb-mounted, single package type. The rooftop units shall be completely factory assembled as a unitary package complete with operating controls and shall be completely piped, internally wired and fully charged with R-410 refrigerant. Only one electrical power connection shall be required.

### 1.03 QUALITY ASSURANCE

A. Equipment shall be installed and wired in accordance with applicable local and national codes.

B. Unit shall conform to the requirements and specifications of NFPA, and applicable local, state, and national codes.

C. Units shall be warranted by manufacturer with full factory warranty on materials and workmanship for one year from date of start-up, or the date of beneficial use, whichever is later.

D. Manufacturer shall provide a minimum five year material warranty on compressor.

### 1.04 SUBMITTALS

A. Shop drawings submittals shall include, but are not limited to, the following:
   1. Unit cut-sheets clearly showing all features, accessories, dimensions, weights, and capacities.
   2. Written instructions for equipment installation.

3. Wiring and piping diagrams and connection locations.
4. Performance certifications and test results.
5. Warranty information.
6. Additional information as required in Section 23 01 00.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The "Basis of Design" is Daikin. Other acceptable manufacturers are:
   1. AAON
   2. Carrier
   3. Trane

2.02 ROOFTOP UNITS

A. General
   1. Factory assembled, single piece heating and cooling unit.
   2. Contained within unit enclosure shall be all factory wiring, piping, refrigerant charge operating oil charge, dual refrigerant circuits, microprocessor based control system and associated hardware.

B. Unit Cabinet
   1. Unit cabinet shall be constructed of heavy gauge galvanized steel with a weather resistant baked enamel finish tested in accordance with ASTM B117.
   2. Cabinet panels shall be hinged or removable for easy servicing and shall provide a water tight seal. All panels and covers shall be insulated with ½ inch, one pound density matt faced, fire resistant, permanent, odorless, fiber glass insulation.
   3. Lifting lugs shall be factory installed to facilitate overhead rigging.
   4. Unit shall be equipped with factory-supplied condensate drain connection for evaporator coil.

C. Fans
   1. Evaporator Fan
      a. Fans shall be forward curved, centrifugal, belt driven single or double wheel and mounted on a common shaft with adjustable motor sheaves. Fan shall be statically and dynamically balanced and tested in the factory. Fan shall not pass through its first critical speed to meet its scheduled performance. The fan and motor assembly shall be mounted on a common base. For units with motor sizes greater than five (5) HP, the entire assembly shall be internally isolated from the rest of the unit with double deflection vibration isolators. Motors shall be thermally protected.
   2. Condenser Fan
      a. Outdoor fans shall be of the direct driven propeller type statically and dynamically balanced in the factory and be protected by a wire guard.

b. Outdoor fans shall discharge air vertically upward and shall have permanently lubricated bearings and thermal overload protection.

D. Compressors
1. Two semi-hermetic or scroll type with unloading capability. Units larger than 25 tons shall be capable of at least four stages of loading.
2. Factory mounted on spring vibration isolators.
3. Equipped with factory-installed crankcase heater, high and low pressure control, outdoor ambient protection, height motor temperature cut-out, compressor sump heat, three phase overload protection, and anti-cycle timer.

E. Coils
1. Evaporator and condenser coils shall have aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed. The coils shall be leak tested at the factory to 200 psig and pressure tested to 450 psig.
2. Coils shall be intertwined circuited to provide two independent refrigeration system.

F. Electric Heating Section
1. Electric heating sections shall be furnished with nickel-chromium open coil resistance heating elements with each element protected by an automatic reset high-limit thermostat and manual reset high- limit thermostat for the primary and secondary over-current/thermal protection. Controls shall provide for multiple stage start-up and operation. Electric module shall be UL listed.

G. Refrigerant Components
1. Refrigerant circuit components shall include: Filter dryers, liquid line sight glasses, compressor discharge valves, liquid line service valves and thermal expansion valves.

H. Filter Section
1. Standard filter section shall consist of low velocity, disposable two inch thick glass fiber filters in commercially available sizes. Filters shall be not less than 30% efficient when tested in accordance with ASHRAE Standards. Temporary filer media shall be provide throughout the course of construction and shall be changed as required to maintain proper unit operation and filtration. Provide new set of filters when building is turned over to the Owner.

I. Controls, Safeties and Diagnostics
1. Controls: Controls shall be accomplished through use of factory installed, microprocessor based control system and associated electronic and electrical hardware. For building with BAS systems, all required control capability and alarm monitoring shall be made available via a compatible interface with the BAS system.
2. Compressor safeties: Compressors shall be equipped with the following protections:

a. Over temperature (shuts down compressor).
b. Over current (shut down individual compressor).
c. Crankcase heaters.
d. Ground fault (shuts down individual compressor).
e. High-pressure switch (shuts down individual compressor, automatic reset type).
f. Low pressure switch (shuts down compressor, automatic reset type).

3. Heating Section Safeties: Heating Section shall be equipped with the following protections:
   a. Loss of airflow switch.
   b. Temperature limit switches.
   c. Flame rollout switches. (gas heating only)
   d. Centrifugal switch mounted on each induced draft fan motor. (gas heating only)
   e. Automatically reset high-limit over-current/thermal protection. (electric heating only)
   f. Manually reset high-limit over-current/thermal protection. (electric heating only)
4. Interlocks shall be made to the duct-mounted smoke detectors in each units supply and return ductwork to shut the unit off and fully close the return air dampers to prevent migration of smoke upon its detection.

J. Operating Characteristics:
1. Unit shall be capable of starting and running at 115°F ambient outdoor temperature per maximum load criteria of ARI Standard 360.
2. Compressor with standard controls shall be capable of operation down to 0°F ambient outdoor temperature.
3. Provides multistage mechanical cooling capability.
4. Unit shall be factory equipped with shutoff valve and tubing to maintain capacity control at minimal cooling loads.

K. Electrical Requirements: All unit power wiring shall enter cabinet at single location.

L. Motors
1. Compressor motors shall be cooled by suction gas passing through motor winding and shall have internal thermal overload protection.
2. Indoor blower poly-phase motor bearing shall be of ball bearing type.
3. Outdoor totally enclosed motors shall have permanently lubricated sealed ball bearing and inherent automatic reset thermal overload protection.
4. Each poly-phase compressor and indoor fan motor shall be protected against over-current and single phasing conditions. Protection devices shall be manual reset type.

M. Accessories to include:
1. Integrated Economizer: For units 7.5 tons and greater, enthalpy controlled integrated type consisting of dampers, motors and linkages, and potentiometer in conjunction with control system to provide primary

cooling using outdoor air, enthalpy permitting, supplemented with mechanical cooling when necessary.

a. Dampers shall be low-leakage type, not to exceed one percent leakage at one inch water gauge pressure differential when fully closed.
b. Linkages shall have spring return feature which shuts dampers upon power interruption or unit shutdown.
c. Capable of introducing up to 100% outside air.
d. Exhaust/Return Air Fan, capable of 100% of maximum economizer supply air flow, shall be forward-curved centrifugal belt type only with fixed pitch pulley drive with optional factory installed inlet vanes or variable speed drive for capacity control Fan shall be controlled by building pressure sensor for active pressure control. Pressure sensor shall be installed in a location representative of the overall building pressure.

2. Barometric relief damper package: (Exhaust fan to be used on units over 20 tons)
   a. Package shall relieve internal pressure and consist of damper assembly, hoods, damper screen, seal strip and required hardwire.
   b. Damper assembly shall close due to gravity upon unit shutoff.
   c. Unit mounted down-flow units only.
3. Roof Curb:
   a. Each unit shall be provided with a full perimeter roof curb. The roof curb shall be of the same manufacturer as the unit, shall support the unit and provide a watertight enclosure to protect ductwork and utility services. Curb design shall comply with National Roofing Contractors Association requirements. Gaskets must be provided at supply/return air openings. Channel shall be provided allowing for adjustment of return air opening location to match the building structural frame indicated.

PART 3 - EXECUTION

3.01 START-UP

A. A factory certified trained service technician shall supervise the installation of equipment and start-up.

B. A factory certified service technician shall fully instruct Owner's personnel in the operation and maintenance of units.

3.02 INSTALLATION

A. Roof Top Air Unit
   1. Install units on roof curbs furnished by unit manufacturer and in accordance with manufacturer's installation instructions.
   2. For rooftop units of 50 tons or greater, provide isolation rails for vibration isolation and install sound attenuation materials inside the roof curb to dampen noise transfer from unit to occupied space. Coordinate added weight with structural engineer.

3. The rigging and setting of the units shall be in accordance with the unit manufacturer's recommendations.
4. All penetrations through unit are to be in factory provided chases. No penetrations through the condensate pan, etc. are permitted.

END OF SECTION 237400

# SECTION 23 81 26 - AIR COOLED SPLIT SYSTEM AIR CONDITIONING UNITS

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the air cooled split system units. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the split system units specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

### 1.02 DESCRIPTION OF WORK

A. Work Included: Provide a UL listed split system air-conditioning unit work including, but not limited to, the furnishing and installation of an indoor evaporator unit, an air-cooled condensing unit, filters, [electric heat section,] thermostat, accessories and other controls as required by local, state, and other applicable codes.

### 1.03 QUALITY ASSURANCE

A. Manufacturer: "Basis of Design" is Trane. Acceptable alternate manufacturers:

1. Carrier
2. Lennox
3. Daikin

B. Certification: Provide manufacturer's certification of compliance with ARI Standard 210.

### 1.04 SUBMITTALS

A. Shop drawings submittals shall include, but are not limited to, the following:

1. Unit cut-sheets clearly showing all features, accessories, dimensions, weights and capacities.
2. Written instructions for equipment to installation.
3. Wiring and piping diagrams and connection locations.
4. Performance certifications and test results.
5. Warranty information.
6. Additional information as required in Section 23 01 00.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver split system air conditioning units and accessories in factory-fabricated water-resistant wrapping.

B. Handle split system air conditioning units and accessories carefully to avoid damage to material components, enclosure and finish.

C. Store split system air conditioning units and accessories in a clean, dry space and protect from the weather.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Except as otherwise indicated, provide split system air-conditioning unit manufacturer's standard materials and components as indicated by his product information, designed and constructed as recommended by the manufacturer and as required for a complete installation.

B. Evaporator Units:

1. General: Provide DX fan coil units of the size and capacity scheduled on the Drawings. All units shall be UL approved and rated in accordance with AIR Industry Standard 441.
2. Basic Unit: Units shall be fabricated of 18 gauge galvanized steel. The fan and motor assembly shall be easily removable for service. Units shall have 1" supply and return duct collars.
3. Cabinet: Cabinets shall be horizontal enclosed type and shall have 18 gauge steel panels acoustically and thermally insulated with 1/2" coated glass fiber insulation meeting NFPA-90A requirements. Exposed panels shall be bonderized and finished with a baked primer and a finish coat of enamel.
4. Coils: DX cooling coils shall have copper tubes with aluminum fins, mechanically bonded to the tubes. Coils for use with single compressor condensing units shall be single circuit and coils for use with dual compressor condensing units shall have two full-face refrigerant circuits. A factory installed thermal expansion valve shall be provided for each circuit. "A" coils shall be factory leak tested at 225 psi air under water. Coils shall have a maximum of 12 fins per inch. Coil air pressure drop shall not exceed scheduled maximum.
5. Electric Heat: Electric heating elements shall be integrally mounted and shall have voltage and capacity as scheduled. Heater elements shall be constructed of heavy-duty nickel chromium wire. Heaters shall be complete with magnetic contactor and all required controls and safeties.
6. Motors: Motors shall be 3-speed, high efficiency, permanent split capacitor type with thermal overload protection. Maximum motor horsepower, input wattage shall not exceed that schedule.

7. Junction Box: Units shall have a factory installed junction box with the fan motor and heating coil wired to the junction box.
8. Fans: Fans shall be of the centrifugal, forward-curved type. Fan wheels shall be statically and dynamically balanced. Fan wheels and housings shall be galvanized steel.
9. Drain Pan: Pans shall be fabricated of 18 gauge galvanized steel lined on the interior surfaces with 1/2" fire retardant closed cell foam. A 7/8" OD sweat fitting shall be provided for primary drain connection. A 1/2" OD overflow secondary drain connection shall be provided. Units shall be provided with a pan extension under the piping area.
10. Filters: Filter shall be 1" throwaway of woven glass fiber and shall be installed in each unit. RA opening shall be a [rear] [bottom] mounted grill or duct connection as shown on the drawings. Three sets of filters shall be supplied for each fan coil units. One set shall be installed at initial unit startup after all ductwork has been blowout and shall be used during balancing and testing, the second set shall be installed at the time of substantial completion and the third set shall be turned over to the Owner. Any additional filter sets required during the construction period shall be the responsibility of the Contractor.
11. Certification: All fan coil unit performance data shall be certified in accordance with AIR 441-70. Units shall be sound-tested and rated in accordance with ARI- 443-70.
12. Unit Controls: Controls shall include a magnetic fan contractor, terminal strip, heater contactor and controls, and all other required controls. All controls shall be factory wired and tested.

C. Air-cooled Condensing Units:

1. General: Provide air cooled condensing units of the size, type, capacity and arrangement as shown and scheduled on the Drawings. Condensing units shall be assembled on a heavy-gauge integral steel base. Units shall be weatherproofed and include hermetic compressor(s), condensing coils, fans and motors, controls and holding charge of R-32/R-454B. Units shall have a control box access panel and removable end panels that allow access to all major components and controls.
2. Unit Frame: Frame shall be a welded assembly of heavy gauge zinc-coated, galvanized steel. Drainage holes shall be provided as required. Exterior surfaces shall be cleaned, phosphatized and coated with an epoxy resin primer and finished with an enamel finish.
3. Refrigeration Circuits: Units up to 7-1/2 tons shall have single compressors with a single compressor. Units 10 tons and larger shall have dual compressors and dual refrigerant circuits for use with a dual circuit cooling coil. Each refrigeration circuit shall have an integral sub-cooling circuit.
4. Compressors: Each compressor shall be a direct-drive hermetic type with centrifugal oil pump; two-point lubrication for each bearing and connecting rod; crankcase heater and well; high strength, ring-type suction and discharge valves; large gas passages and minimum clearance volumes; and rubber-in-shear isolators; and a thermostatically controlled crankcase heater.

5. Compressor Motors: Each compressor motor shall be suction gas-cooled and have a voltage utilization range of plus or minus 10 percent of nameplate voltage. Internal temperature and current-sensitive motor overloads shall protect compressors under loss of charge and other abnormal operating conditions.
6. Condenser Fans: Fans shall be vertical discharge, direct-drive type, statically and dynamically balanced, with aluminum blades and zinc-plated steel hubs. Motors shall have permanently lubricated ball bearings, built-in current and thermal overload protection and weather-tight slingers over bearings. The fan motors shall be mounted in rubber isolators. Corrosion resistant fan grills shall be provided.
7. Condenser Coils: Condenser coils shall be aluminum fins mechanically bonded to seamless copper tubing. Sub-cooling circuit(s) shall be provided as standard for each refrigeration circuit. Coils shall be factory pressure and leak-tested to 425 psig air pressure. Corrosion resistant metal grilles for coil protection shall be provided.
8. Controls: Unit controls shall include a fused 24-volt control power transformer, magnetic contactors for each compressor, cooling low ambient fan switches, high pressure cut-out(s), low pressure cut-out(s) and reset relays. Unit completely factory-wired with necessary controls and terminal block for connection of field control power wiring. An anti-recycle timer shall be provided. Provide low ambient controls, as scheduled.
9. Refrigerant/Oil Charge: Units shall be shipped from the factory with a sufficient charge of refrigerant and oil for the complete system when used with pre-charged refrigerant lines.
10. Refrigerant Line Connections: Connections shall be either compression or sweat type. Brass liquid and suction line service valves, gauge/charging ports in the liquid line and a sight glass in the liquid line shall be provided.
11. Low Ambient Operation: Units shall include head pressure controller dampers, fan speed control or hot gas bypass as required to allow starting and operation down to 0°F.
12. Warranty: The manufacturer's one year parts and labor and five year extended (non pro-rated) compressor warranty shall be provided.

## PART 3 – EXECUTION

### 3.01 INSTALLATION

A. General: Install each computer room air conditioning system in accordance with manufacturer's instructions, the NEC, and applicable local codes and ordinances. Test installed system for compliance with these Specifications. Rework as required and as directed to ensure that specified and indicated requirements are met and that installed systems function as intended.

B. Mounting: Provide foundation, platforms, and hangers required for proper installation of equipment.

C. Fans: Install fans to operate without noticeable vibration or noise after installation.

D. Guards: Arrange belt guards to permit accessible tachometer readings, oiling, and testing with guards in position.

E. Refrigerant Piping: Install, test, evacuate and charge refrigerant piping per the manufacturer's recommendations and as specified in Section 23 23 00, "Refrigerant Piping". Technician performing this work shall be certified and shall utilize proper refrigerant reclaim procedures.

F. Identification: Refer to Section 23 05 53, "Equipment and Piping Identification", for applicable painting, nameplate, and labeling requirements. Nameplates on units in finished areas shall be installed inside the unit cover and the unit manufacturers labeling system shall be used for exposed labeling of units.

END OF SECTION

# SECTION 238129 - DUCTLESS AIR-COOLED SPLIT SYSTEM AIR CONDITIONING UNITS

## PART 1 – GENERAL

### 1.1 SYSTEM DESCRIPTION

A. The Heat Pump system shall be a ductless split system with Variable Speed Inverter Compressor technology. The system shall consist of a horizontal discharge, single phase outdoor unit, a matched capacity indoor section that shall be equipped with a wired wall-mounted, wireless wall-mounted or wireless handheld remote controller.

Manufacturers are: Daikin, Trane, Mitsubishi, York, Carrier.

### 1.2 QUALITY ASSURANCE

A. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL) and shall bear the ETL label.

B. All wiring shall be in accordance with the National Electrical Code (N.E.C.) and local codes as required.

C. The units shall be rated in accordance with Air-conditioning, Heating, and Refrigeration Institute's (AHRI) Standard 240 and bear the ARI Certification label.

D. The units shall be manufactured in a facility registered to ISO 9001 and ISO 14001, which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

E. A dry air holding charge shall be provided in the indoor section.

F. The outdoor unit shall be pre-charged with R-410a refrigerant for 100 feet (20 meters) of refrigerant tubing.

### 1.3 DELIVERY, STORAGE AND HANDLING

A. Unit shall be stored and handled according to the manufacturer's recommendations.

B. The controller shall be shipped separately and shall be able to withstand 105°F storage temperatures and 95% relative humidity without adverse effect.

## PART 2 – WARRANTY

2.1 The units shall have a manufacturer's parts and defects warranty for a period one (1) year from date of installation. The compressor shall have a warranty of five (5) years from date of installation. If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty does not include labor.

PART 3 - OUTDOOR UNIT DESIGN

3.1

A. The outdoor unit shall be compatible with the four different types of indoor units (ceiling suspending, ducted, wall mounted and four way recessed ceiling cassette). The connected indoor unit shall be of the same capacity as the outdoor unit.

B. The outdoor unit shall be equipped with an electronic control board that interfaces with the indoor unit to perform all necessary operation functions.

C. The outdoor unit shall be capable of cooling operation down to 0°F (-18°C) ambient temperature.

D. The outdoor unit shall be able to operate with a maximum height difference of 100 feet (30 meters ) between indoor and outdoor units.

E. System shall operate at up to a maximum refrigerant tubing length of 100 feet (30 meters) for the 18,000 and 165 feet (50 meters) for the 24,000, 30,000, 36,000, and 42,000 BTU/h units between indoor and outdoor units without the need for line size changes, traps or additional oil.

F. The outdoor unit shall be completely factory assembled, piped, and wired. Each unit must be test run at the factory.

3.2 CABINET

A. The casing shall be constructed from galvanized steel plate, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection.

B. Mounting feet shall be provided and shall be welded to the base of the cabinet and be of sufficient size to afford reliable equipment mount and stability.

C. Easy access shall be afforded to all serviceable parts by means of removable panel sections.

D. The fan grill shall be of ~~ABS~~ plastic.

E. Cabinet mounting and construction shall be sufficient to withstand 155 MPH wind speed conditions for use in Hurricane condition areas. Mounting, base support, and other installation to meet Hurricane Code Conditions shall be by others.

3.3 FAN

A. Models shall be furnished with a DC fan motor.

B. The fan blade(s) shall be of aerodynamic design for quiet operation, and the fan motor bearings shall be permanently lubricated.

C. The outdoor unit shall have horizontal discharge airflow. The fan shall be mounted in front of the coil, pulling air across it from the rear and dispelling it through the front. The fan shall be provided with a raised guard to prevent external contact with moving parts.

3.4 COIL

A. The L shaped condenser coil shall be of copper tubing with flat aluminum fins to reduce debris build up and allow maximum airflow. The coil shall be protected with an integral metal guard.

B. Refrigerant flow from the condenser shall be controlled by means of an electronic linear expansion valve (LEV) metering device. The LEV shall be control by a microprocessor controlled step motor.

C. All refrigerant lines between outdoor and indoor units shall be of annealed, refrigeration grade copper tubing, ARC Type, meeting ASTM B280 requirements, individually insulated in twin-tube, flexible, closed-cell, CFC-free (ozone depletion potential of zero), elastomeric material for the insulation of refrigerant pipes and tubes with thermal conductivity equal to or better than 0.27 BTU-inch/hour per Sq Ft / °F, a water vapor transmission equal to or better than 0.08 Perm-inch and superior fire ratings such that insulation will not contribute significantly to fire and up to 1" thick insulation shall have a - Flame-Spread Index of less than 25 and a Smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102.

3.5 COMPRESSOR

A. The compressor shall be a DC twin-rotor rotary compressor with Variable Speed Inverter Drive Technology. The compressor for model 3.6 Tons and greater shall be a Frame Compliant Scroll compressor with Variable Speed Inverter Drive Technology.

B. The compressor shall be driven by inverter circuit to control compressor speed. The compressor speed shall dynamically vary to match the room load for significantly increasing the efficiency of the system which shall result in significant energy savings.

C. To prevent liquid from accumulating in the compressor during the off cycle, a minimal amount of current shall be automatically, intermittently applied to the compressor motor windings to maintain sufficient heat to vaporize any refrigerant. No crankcase heater is to be used.

D. The outdoor unit shall have an accumulator and high pressure safety switch. The compressor shall be mounted to avoid the transmission of vibration.

3.6 ELECTRICAL

A. The electrical power of the unit shall be 208 volts or 230 volts, single phase, 60 hertz. The unit shall be capable of satisfactory operation within voltage limits of 187 volts to 253 volts.

B. Power for the indoor unit shall be supplied from the outdoor unit via Controller.

C. The outdoor unit shall be controlled by the microprocessor located in the indoor unit.

3.7 OPERATING RANGE:

| Operating Range | | Indoor Air Intake Temperature | Outdoor Air Intake Temperature |
|---|---|---|---|
| Cooling | Maximum | D.B. 95°F (35°C) W.B. 71°F (21.7°C) | D.B. 115°F (46°C) |
| | Minimum | D.B. 67°F (19.4°C) W.B. 57°F (13.9°C) | D.B. 0°F (-18°C)* |
| Heating | Maximum | D.B. 80°F (26.7°C) W.B. 67°F (19.4°C) | D.B. 70°F (21.1°C) W.B. 59°F (15°C) |
| | Minimum | D.B. 70°F (21.1°C) W.B. 60°F (15.6°C) | D.B. 12°F (-11.1°C) W.B. 10°F (-12.2°C) |

* Requires wind baffle – without wind baffle: D.B. 23°F (-5°C)

A. Unit shall be able to provide 100% capacity when operating at 0°F outdoor air temperature and a wind baffle is used.

PART 4 - INDOOR UNIT SELECTION AND SPECIFICATION

4.1

A. WALL MOUNTED TYPE

The indoor unit shall be factory assembled, wired and tested. Contained within the unit hall be all factory wiring and internal piping, control circuit board and fan motor. The unit, in conjunction with the wired wall-mounted, wireless wall-mounted or wireless handheld controller, shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes shall be purged with dry air before shipment from the factory.

B. UNIT CABINET

The cabinet shall be formed from high strength molded plastic with smooth finish, flat front panel design with access for filter. Cabinet color shall be white. The unit shall be wall mounted by means of a factory supplied, pre-drilled, mounting plate.

C. FAN

The indoor unit fan shall be high performance, double inlet, forward curve, direct drive sirocco fan with a single motor. The fans shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings. The indoor fan shall be capable of multiple speeds. The fan shall have a selectable Auto fan setting that will adjust the fan speed based on the difference between controller set-point and space temperature.

D. VANE

There shall be a motorized horizontal vane to automatically direct air flow in a horizontal and downward direction for uniform air distribution. The horizontal vane shall significantly decrease downward air resistance for lower sound levels, and shall close the outlet port when operation is stopped. There shall also be a set of vertical vanes to provide horizontal swing airflow movement.

E. FILTER

Return air shall be filtered by means of an easily removable washable filter.

F. COIL

The evaporator coil shall be of nonferrous construction with pre-coated aluminum strake fins on copper tubing. The multi-angled heat exchanger shall have a modified fin shape that reduces air resistance for a smoother, quieter airflow. All tube joints shall be brazed with PhosCopper or silver alloy. The coils shall be pressure tested at the factory. A condensate pan and drain shall be provided under the coil. An optional drain pan level switch (DPLS1), designed to connect to the control board, shall be provided if required, and installed on the condensate pan to prevent condensate from overflowing. A condensate mini-pump shall be provided to provide a means of condensate disposal when a gravity drain is not available.

G. ELECTRICAL

The electrical power of the unit shall be 208 volts or 230 volts, 1 phase, 60 hertz. The system shall be capable of satisfactory operation within voltage limits of 187 volts to 253 volts. The power to the indoor unit shall be supplied from the outdoor unit.

H. PERFORMANCE

Each system shall perform in accordance to the ratings shown in the table below. Cooling performance shall be based on 80°F DB, 67°F WB (26.7°C DB, 19.4°C WB) for the indoor unit and 95°F DB, 75°F WB (35°C DB, 29.3°C WB) for the outdoor unit. Heating performance shall be based on 70°F DB, 60°F WB (21.1°C DB, 15.6°C WB) for the indoor unit and 47°F DB, 15°F WB (8.3°C DB, 6.1°C WB) for the outdoor unit.

I. SYSTEM CONTROL

The control system shall consist of a minimum of two (2) microprocessors, one on each indoor and outdoor unit, interconnected by a single non-polar two-wire cable. The microprocessor located in the indoor unit shall have the capability of monitoring return air temperature and indoor coil temperature, receiving and processing commands from a wireless or wired controller, providing emergency operation and controlling the outdoor unit. The control signal between the indoor and outdoor unit shall be pulse signal 24 volts DC. Indoor units shall have the ability to control supplemental heat via connector CN152 and a 12 VDC output.

J. The indoor unit control board shall have auxiliary control contact connectors to provide:

| Function / Model | |
|---|---|
| CN-2L – Lossnay Control | X |
| CN-24(152) Back-up Heat | X |
| CN-32 – Remote Switch | X |
| CN-51 – Central Control | X |
| CN-105 – IT Terminal | X |

X = Included

K. Remote Controllers

1. Wired Remote Controller

The Wired Remote Controller shall be an LCD display. The Controller shall support a selection from multiple languages for display information. There shall be a built-in weekly timer. The controller shall consist of an On/Off button, Increase/Decrease Set Temperature buttons, a Cool/Auto/Fan/Dry mode selector, a Timer Menu button, a Timer On/Off button, Set Time buttons, a Fan Speed selector, a Ventilation button, a Test Run button, and a Check Mode button. The controller shall have a built-in temperature sensor. Temperature shall be displayed in either Fahrenheit (°F) or Celsius (°C), and Temperature changes shall be by increments of 1°F (0.5°C).

The control voltage from the wired controller to the indoor unit shall be 12/24 volts, DC. Field wiring shall run directly from the indoor unit to the wall mounted controller with no splices. Up to two wired controllers shall be able to be used to control one unit.

The basic functions are:

| Wired Remote Controller | |
|---|---|
| Item | Description |
| ON/OFF | |
| Operation Mode | Run and stop operation |
| Temperature Setting (Range and modes depend on connected unit model) | Switches between Cool/Dry/Auto/Fan/Heat. |
| Fan Speed Setting (Range and modes depend on connected unit model) | Sets the setpoint temperature in the following range<br>Cool/Dry: 67°F-87°F<br>Heat: 63°F-83°F<br>Auto: 67°F-83°F |
| Error | ON/OFF/Temperature setting. The time can be set by the 1-minute interval. |
| Auto Lock Out Function | When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed |
| | Setting/releasing of simplified locking for remote control buttons can be performed.<br>• Locking of all buttons<br>Locking of all buttons except ON/OFF button |

END OF SECTION 238129

# SECTION 238200 - ELECTRIC HEATERS

## PART 1 – GENERAL

### 1.01 SUMMARY

A. The General Provisions, Supplemental General Provisions, section 23 01 00, Division 1 Specifications and Special Provisions apply to all Work specified in this Section.

B. This section describes the basic materials and installation methods for the electric heaters. Comply with other Division 23 sections and drawings as applicable. Refer to other divisions for coordination of work.

C. Furnish and install all components of the electric heaters specified herein, as indicated on the drawings, and as required to provide complete and operating systems.

### 1.02 DESCRIPTION OF WORK:

A. Work Included: Provide electric heating and cooling units, as specified, which may include:

1. Electric unit heaters
2. Additional information as required in Section 23 01 00.

### 1.03 QUALITY ASSURANCE:

A. The complete assembly, not just components, shall be approved as a unit by Underwriters' Laboratories, Inc. (UL) and shall bear the UL label, where required by code. Equipment shall be installed and wired in accordance with applicable local and national codes.

### 1.04 SUBMITTALS:

A. Shop drawings submittals shall include, but are not limited to, the following:

1. Unit cutsheets clearly showing all features, accessories, dimensions, weights and capacities.
2. Complete color samples for selection.
3. Written instructions for equipment to installation.
4. Wiring and piping diagrams and connection locations.
5. Performance certifications and test results.
6. Warranty Information.
7. Additional information as required in Section 23 01 00.

## PART 2 – PRODUCTS

### 2.01 MANUFACTURERS:

A. Chromalox

B. Indeeco

C. QMark

D. Berko

E. Brasch

F. Markel

G. Electric Heaters, Inc.

H. Nailor

I. Tutco

J. Warren

2.02 EQUIPMENT:

A. [Electric Unit Heaters (EUH):]

1. As manufactured by QMark.
2. Other acceptable manufacturers: Brasch, Chromalox, Markel
3. Cabinet shall be 18 gauge dip formed steel.
4. Paint of phosphate undercoat or corrosion resistance and finished in neutral gray, baked enamel.
5. Heating element shall be corrosion-resistant fin tube with reset thermal overload protection, magnetic contactor for remote control.
6. Remote thermostat shall be line voltage SPST with temperature range of
7. 40°F to 70°F, wall mounted.
8. Fan shall be dynamically balanced with totally enclosed continuous duty sleeve bearings, with built-in thermal overload protection.
9. Capacities and electrical characteristics: Scheduled on drawings.

PART 3 – EXECUTION

3.01 INSTALLATION:

A. Install units in accordance with manufacturer's instructions.

B. Install units where indicated on drawings.

C. Provide supports, for pedestal type wall fin per manufacturer's recommendations.

END OF SECTION 238200

# SECTION 260100 - GENERAL ELECTRICAL REQUIREMENTS

## PART 1 - GENERAL

### 1.01 SUMMARY

A. The Drawings are schematic and are not intended to show the exact location of outlets, devices, etc. or the routing of conduit.

B. Dimensions and information regarding accurate locations of equipment, and structural limitations and finish shall be coordinated and verified with other Divisions of Work. Be prepared to provide dimensions and information regarding the Work of this Division to other trades.

C. The right is reserved to relocate any device (receptacle, switch, fire alarm, audio/visual, junction box, outlet, etc.) a maximum of 10'-0" before it is permanently provided without incurring additional cost to the Contract.

### 1.02 REFERENCE STANDARDS

A. All work shall comply with the most recently revised versions of all local, state and federal codes, ordinances of the authority having jurisdiction, laws, rules and regulations. Any modifications required by any of the above shall be made without any additional cost to the owner. Where requirements between governing Codes and Regulations vary, the more restrictive provision shall apply.

B. Nothing contained in the Contract Documents shall be construed as authority or permission to disregard legal requirements and regulations. The Contractor shall thoroughly review the Documents and bring any such conflicts to the attention of the Architect and Engineer prior to installation.

C. All materials shall be new and shall bear the label of U.L.

### 1.03 EXISTING CONDITIONS

A. Where work is to be performed in an existing facility, the contractor shall visit the site prior to bid and be familiar with all existing conditions. Special attention shall be given to work to be performed above an existing ceiling.

B. Where existing slabs are to be cut or core drilled, the contractor shall x-ray the existing slabs to avoid cutting or disrupting existing conduits, cables, plumbing or structural members.

C. The electrical service to the building shall not be interrupted without written consent of the building owner.

D. No allowance will be made for lack of knowledge of existing conditions.

E. At the completion of the project, all work under this Division shall be completely integrated with the existing systems and left in perfect operating condition.

F. Where work under this Division disrupts the continuity of any existing to remain circuit or feeder, the Contractor shall repair/replace as necessary to return to a perfectly functional and safe operating condition.

G. Prior to any demolition or construction, the Contractor shall have the existing conditions inspected by an EPA, OSHA certified asbestos abatement agency to identify the presence of asbestos. Should any asbestos be found it shall be brought to the immediate attention of the Architect and Owner and specifically identified in writing.

1.04 DEFINITIONS

A. Provide: to furnish, install and connect.

B. Furnish: to supply all materials, labor, equipment, testing apparatus, controls, tests, accessories and all other items customarily required for the proper and complete application.

C. Install: to join, unite, fasten, link, attach, set-up or connect together, complete, tested, and ready for normal satisfactory operation.

D. Engineer: The Engineer of record.

E. Contract Documents: the complete set of Specifications and Drawings of all Divisions.

F. Work: labor, materials, equipment, accessories, controls and other items required for a complete installation.

G. Concealed: embedded in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces or in enclosures.

H. Conduit: rigid steel; intermediate metal conduit (IMC), plastic conduit (PVC), electrical metallic tubing (EMT), or flexible steel conduit.

I. Manufactured Cable: pre-wired metal clad manufactured cable bearing a U.L. label; metal clad cable (MC), health care (HCF).

J. Wiring/Wired: all wire installed in conduit to equipment, device, junction box, light fixture, etc. from panel board or switchgear with all required boxes, connectors, couplings, etc.

K. Exposed: not installed underground or concealed.

L. Equal: equal in quality, workmanship, materials, weight, size, design and efficiency of the specified product, conforming to manufacturers.

M. Supply: to purchase, procure, acquire and deliver complete with related accessories.

N. Authority Having Jurisdiction (AHJ): applicable local, state and federal authorities having jurisdiction over any part of the Scope within this Division and other Divisions.

1.05 SHOP DRAWINGS AND PRODUCT DATA

A. The Contractor shall obtain complete shop drawings, product data and samples from the manufacturers, suppliers, vendors for all materials and equipment as specified herein in various Sections of the Specifications, and shall submit data and details of such materials and equipment for review per Section 01 33 00.

B. Shop drawings and/or product data shall be submitted for the following for review:
   1. Switchboards, panelboards, transformers, busway, motor control centers, ground fault system and other equipment associated with the main distribution.
   2. Disconnect switches, fuses, motor starters.
   3. Lighting fixtures, lighting control system, dimming system, emergency batteries and other equipment associated with lighting.
   4. Transient voltage surge protection.
   5. Generator, UPS, transfer switches, batteries, static switches, transition switches, switchgear and other equipment associated with emergency and/or standby back-up power systems.
   6. Devices, receptacles, switches, coverplates, motion sensors. The product data shall include the manufacturers name, model number, size and color.
   7. Conduit, wire, boxes, fittings.

C. Shop drawing shall be submitted as one complete package for all electrical systems. Shop drawing will not be reviewed until all systems are provided to engineer.

D. If the shop drawings are rejected, the engineer will review the submittal one additional time. If the shop drawings are rejected the second time, the engineers' time will be billed to contractor on hourly basis.

1.06 AS-BUILT DRAWINGS

A. The Contractor shall maintain on a daily basis at the Project site a complete set of "Record Drawings". Project Record Documents shall be maintained as specified in Division 01.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer's names and catalog numbers specified in the Contract Documents are intended to describe the material and set the standard of quality. All bids shall be based on material specified. Request for approval of material not specified shall be considered if the request is in written form and submitted to the Architect no later than fourteen (14) days prior to the bid date. All requests shall conform to the provisions of the general and supplementary conditions.

B. When specific names are not stated, only the best available quality of material or equipment shall be submitted for review and used in the installation.

2.02 BASIS OF DESIGN

A. Where a product is designated as "BASIS OF DESIGN", the Contractor is notified that mechanical, electrical, structural, architectural, space conditions and/or other features of the overall project design have been based on the requirements of the "BASIS OF DESIGN" product.

B. Where a product is substituted for a "BASIS OF DESIGN" product, the Contractor shall notify the design team that changes in project design may be mandatory in order to permit use and installation of the substitute product. Shop drawing submittal for a substitute product shall include a complete schedule of changes in project design, if any, which must be made in order to permit use and installation of the substitute product. The Contractor shall be responsible for the coordination of all trades for use of the substituted product. The Contractor shall bear all expenses related to the use of a substitute product.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The equipment selections used in the preparation of the Contract Documents will fit into the physical spaces provided and indicated, allowing ample room for access, servicing, removal and replacement of parts, etc. Adequate space shall be allowed for clearance in accordance with the Code requirements and the requirements of the local Authorities having jurisdiction, and the equipment manufacturer 's recommendations.

B. In the preparation of Drawings, a reasonable effort to accommodate acceptable equipment manufacturer's space requirements has been made. However, since space requirements and equipment arrangement vary according to each manufacturer, the responsibility for initial access, maintenance access, code required access, and proper fit rests with the Contractor.

C. Physical dimensions and arrangements of equipment to be installed shall be subject to the Architect's and Engineer's review.

D. The General Contractor and all Subcontractors shall coordinate the installation of ductwork, conduit, busway, piping, cable trays, etc., installation with lighting fixtures, special ceiling construction, air distribution equipment, and the structure. Provide additional rises, drops and offsets as required. If after installed, new ductwork, conduit, busway, piping or cable is found to be in conflict with the architecture, structure, or other trade Work which is either existing or shown on the Contract Documents, the ductwork, conduit, busway, piping or cable shall be relocated without additional cost to the Owner.

E. No conduit, equipment, busway, etc., shall be installed in the eight (8) inch high zone directly above the ceiling in tenant areas to allow for tenant build-out and

flexibility unless otherwise specifically shown on the Drawings or prior written authorization is received from the Engineer.

F. Accessibility and Clearance:
   1. Electrical equipment, outlets, junction and pull boxes shall be installed in accessible locations, avoiding obstructions, preserving headroom, and keeping openings and passageways clear.
   2. Minor adjustments in the locations of equipment shall be made where necessary, providing such adjustments do not adversely affect functionality of the equipment.

G. Scaffolds and staging for installation of electrical work shall be provided under the work of this Division.

3.02 STRUCTURAL FITTINGS

A. Provide the necessary sleeves, inserts, hangers, anchor bolts, and related structural items. Provide at the proper time.

B. Openings may have been indicated on the Architectural and Structural drawings. Should any additional openings or holes be required, the same shall be provided at no additional cost to the Owner.

C. Location: At a time in advance of the work, verify openings shown on the Architectural and Structural drawings, and coordinate any additional openings.

D. If the work of this Section requires modification of the Architectural or Structural drawings, provide new instructions as to requirements for these openings. Submit for review and coordination to Architect.

E. Sleeves shall be supplied for electrical conduits passing through walls or slabs and shall be placed before concrete is poured.

F. Equipment supports for electrical work shall be fastened to the structure by inserts, anchor bolts, bolting to drilled and tapped structural members, or be welded to the structure.
   1. Welding shall be done by the electric arc method with fully competent welders. Supporting members shall be shop coated with a suitable primer.
   2. Surfaces damaged by installation of supports shall be touched up with primer to match shop coat. Any drilling of structural members shall be approved by the Architect.

G. Flashing:
   1. Wherever conduits pass through the roof or outer walls, base flashing and counter flashing shall be provided.
   2. Such flashing shall be properly installed by skilled workmen, and shall include grouting, mastic or tar application, or other means to insure a permanent, waterproof, neat and workmanlike installation.

3. Insofar as possible, flashing shall comply with and be similar to requirements for flashing in General Construction Work.

H. Anchor bolts and inserts shall be galvanized and of adequate size and strength for installation of electrical work and shall be placed in forms before concrete is poured.
1. Placement of bolts in bases shall be done under other Division. Provide detail drawings, templates, and anchor bolts for bases to the General Contractor in time to avoid delaying work schedules.
2. Expansion shields shall only be used with specific approval of the Architect. Wooden or soft metal plugs shall not be used.

I. Cutting and patching:
1. All additional cutting, patching and reinforcement of construction of building, subject to review by the Architect, shall be performed under this Section.
2. Refer to appropriate Division for requirements.

3.03 WEATHERPROOF EQUIPMENT

A. Electrical devices or equipment located in damp; semi-exposed areas shall be weather-resistant. Enclosures shall comply with NEMA Type 3R requirements.

B. Surface mounted outlet boxes shall be cast metal with threaded bolts. Pull or junction boxes shall be cast metal with bolted and gasketed covers.

C. Outlet box covers shall be of a suitable weatherproof type with gaskets, packing glands, weatherproof doors, or other required means to prevent entry of moisture.

D. Lighting fixtures shall be provided with suitable gasket, and UL labeled for location.

3.04 CLEANING

A. Brush and clean work prior to concealing, painting and acceptance. Perform in stages if directed.

B. Painted exposed work soiled or damaged: Clean and repair to match adjoining work before final acceptance.

C. Remove dust and debris from inside and outside of material and equipment.

3.05 IDENTIFICATION OF CIRCUITS AND EQUIPMENT

A. Numbered adhesive strip tags shall be attached to branch circuit wiring in conduits at every point where runs are broken or terminated. Also tag pull wires in empty conduits.

B. Junction and Pull boxes shall have covers stenciled with box number when shown on the drawings, or circuit numbers according to panel schedules. Data shall be lettered in a conspicuous manner with a color contrasting to finish.

C. All feeders for switchboard shall have labels that indicate the phase and designation.

3.06 TESTS AND DEMONSTRATIONS

A. All systems shall be tested in the presence of the Owner or an Owner designated representative upon completion of the Work and demonstrates that the installation is in accordance with the Contract Documents.

B. All motors shall be checked and adjusted for correct direction of rotation.

C. Loading of circuits and feeders in panelboards shall be checked and balanced.

D. Any work found not to be in compliance with the Contract documents shall be repaired or replaced without incurring additional cost to the Contract price.

E. Provide all instruction to the Owner on maintenance and operation of all systems and equipment provided under this Division.

3.07 WARRANTIES

A. The warranty period for all systems, equipment, components, work, etc. shall be no less than one (1) year, unless specified otherwise hereinafter and shall include at least one (1) full heating season and one (1) full cooling season.

B. The Contractor shall, without cost to the Owner, remedy any defects within a reasonable time to be specified in notice from the Architect. In default thereof, the Owner may have such work done and charge all costs to the Contractor.

C. The start of the Contractor's warranty period, as defined in the General Conditions, shall commence on the issue of a "Certificate of Substantial Completion", by the Owner or the Owner's Representative for each item of material, equipment or system.

D. The Subcontractor shall confer with the General Contractor prior to the bid date concerning the project schedule and determine if there is a need to operate any items of equipment or systems for temporary heating an/or cooling or other reasons prior to "Substantial Completion". All required extended warranty costs for equipment, materials, and systems shall be included in the Subcontractor's bid.

END OF SECTION 260100

# SECTION 260500 - RACEWAYS AND WIRING – 600 VOLT

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Provide all raceways and wiring specified herein and as required to provide a complete system throughout the project as indicated on the Drawings.

## PART 2 - PRODUCTS

### 2.01 CONDUIT

A. Galvanized Rigid Steel Conduit (GRC): Rigid steel conduit shall be galvanized, constructed of high-grade raw steel piping, galvanized inside and outside with threaded joints.

B. Intermediate Metal Conduit (IMC): IMC shall be constructed of high-grade steel tubing, galvanized inside and outside with threaded joints. Zinc coating shall be applied by the hot-dip, galvanized process.

C. Electrical Metallic Tubing (EMT): EMT shall be constructed of high-grade steel, zinc coated and galvanized inside and outside.

D. Rigid Plastic Conduit (PVC): PVC conduit shall be polyvinyl chloride rigid scheduled to heavy wall type. PVC conduit shall be joined with PVC couplings of the solvent cement type to provide complete watertight joints. Conduit systems shall be UL listed for direct burial and exposed use.

E. Flexible Metal Conduit: Shall be flexible steel conduit tubing spirally wound having a hot-dip galvanized coating and meeting requirements of UL for flexible metal conduit.

F. Liquid tight Flexible Metal Conduit: Shall be flexible steel conduit spirally wound and shall have a copper grounding strand and factory-applied neoprene jacket. Liquid tight flexible conduit shall meet the requirements of UL.

### 2.02 CONDUIT FITTINGS

A. GRC and IMC: shall be factory-made taper threaded and of the same material as the conduit. Provide with molded nylon insulating bushing or throat at all boxes and cabinets with locknuts inside and outside. Provide watertight hubs in wet locations for terminations into enclosures. Provide insulated grounding bushing where required.

B. EMT: shall be of the same material as the conduit and shall be hexnut compression or steel setscrew. Provide with molded nylon insulating bushing or throat at all boxes and cabinets. Provided insulated grounding bushing where required.

C. PVC: shall be Schedule 40 and of the same manufacturer as the conduit.

D. Flexible Metal Conduit and Liquidtight Flexible Metal Conduit: Provide couplings at connections between flexible and rigid conduit suitable for that application. Provide with nylon-insulated busing or throat at all boxes and cabinets with locknuts.

E. Expansion Joints: Provide O.Z./Gedney, Type AX expansion joint fittings for all conduit which crosses an expansion joint. Provide with internal ground and external bonding jumper.

F. Wire Support Bushings: Provide for vertical runs as required by the NEC.

2.03 PRE-WIRED MANUFACTURED CABLE

A. Pre-wired manufactured cable may be used for branch circuit wiring for receptacle and lighting circuits where acceptable by the AHJ.

B. Pre-wired manufactured cables shall NOT be used for:
1. Mechanical equipment branch circuits
2. Feeders
3. Homeruns
4. Exposed

C. Conduits connecting receptacle and switch circuits to lighting and power homerun boxes in finished areas, type "MC" cable consisting of one (1), two (2), three (3) or four (4) copper "THW", "THHN" or "THHN/THWN" insulated phase, neutral and ground conductors. Ground shall be of minimum size required by NEC, as specified in other Sections and as noted on the Drawings.

D. Pre-wired cables used for receptacle and equipment through-out a "health-care facility" shall be type "HCF", with a continuous green colored metal sheath UL approved for grounding purposes. HCF cable shall NOT be used for Essential Electrical System (Life Safety, Critical, Equipment) branch circuits.

E. Pre-wired manufactured cable may be used where concealed in walls or in millwork only. Cable shall run from the first device in the wall or millwork or first light fixture to a structurally mounted junction box no more than 10'-0" from the point which the cable enters the ceiling space or from first light fixture.

F. Cable shall not pass through a fire rated wall or assembly.

G. Acceptable cable manufactures are AFC, Alflex and Southwire.

H. Cable termination fittings shall be O. Z. Gedney C5, T&B #253, Steel City Series XC-400 or approved equal clamp-type, malleable iron fittings. Die-cast fittings are not acceptable.

2.04 JUNCTION BOXES AND PULL BOXES

A. Junction boxes and Pull boxes shall be galvanized steel with mode size and gauge as required by the NEC in accordance with voltage parameters. Covers shall be of the same gauge as the box as shall be screw fastened. Boxes shall be sized as required but no smaller than 4 inches square and 1-1/2 inches deep.

B. Covers shall be accessible.

C. Provide galvanized cast iron or aluminum with threaded hubs and gaskets for outdoor and damp locations.

D. Boxes in grade or underwater shall be cast brass or bronze.

2.05 OUTLET BOXES

A. Outlet boxes shall be UL listed, and of sizes and types required for the application.

B. Boxes Recessed in Construction: Sheet steel boxes, unless noted or required otherwise. Boxes shall be no lighter than 14 gauge and shall be galvanized after fabrication. Set so face of box will finish flush with building surface.
   1. For Lighting Fixture Outlets: 4-inch square with raided fixture ring.
   2. For Wall Switches, Receptacles, and Communication Use: 4-inch square, one-piece; no sectional boxes permitted. Use boxes with plaster rings in all plastered walls where wall thickness permits. Use boxes less than 1-1/2-inch-deep only in locations where deep boxes cannot be accommodated by construction.

C. Boxes Used Outdoors or in Damp/Wet Locations: Cast metal boxes (iron and alloy) with gasketed covers and threaded hubs.

D. Boxes in Hazardous Areas: Approved cast metal boxes with appropriate sealing fittings.

E. Provide blank cover for boxes without fixture or device.

F. Boxes in grade or underwater shall be cast brass or bronze.

G. Cycolac: Per code for pools and fountains only.

2.06 WIREWAYS AND AUXILLARY GUTTERS

A. Wireways shall be constructed in accordance with UL 870. Every component including lengths, connectors, and fittings shall be UL listed and labeled. Provision shall be included in the construction to allow screwing the hinged cover closed without the use of parts other than the standard lengths, fittings, and connectors. It shall also be possible to seal the cover in the closed position with a sealing wire.

B. Wireways shall be constructed with/without knockouts, as required. Enclosure type shall be as required by conditions encountered.

C. Gutters and Wireways shall be suitable for "lay-in" conductors. Connector covers shall be permanently attached so that removal is not necessary to utilize the lay-in feature.

D. All sheet metal parts shall be provided with a rust-inhibiting phosphatizing coating and gray baked enamel finish. All hardware shall be plated to prevent corrosion. All screws installed toward the inside shall be protected by spring nuts or otherwise guarded to prevent wire insulation damage.

E. All connectors shall be slip-in type with self-retaining mounting screws. All hangers shall be two-piece with hook-together feature to permit pre-assembly of wireway and hanger bottom plate before hanging on pre-installed upper bracket.

2.07 SURFACE METAL RACEWAY

A. Surface metal raceway shall be UL listed and labeled; shall be used together with couplings, clips, bushings, straps, connectors, connection covers, elbows, extension boxes, fixture boxes, extension adapters, blank covers and all other required fittings; shall be of the proper size to accommodate the conductors to be installed therein in each case.

2.08 CONDUCTORS – 600 VOLTS OR LESS

A. Provide conductors of stranded copper, 98% conductivity, new building wire, insulated in accordance with the requirements of the NEC. Insulation shall be rated no less than 600-volt. Conductors shall be Type "THWN" or "THHN/THWN". Conductors for service and distribution feeders shall be "XHHW". Solid conductors terminating in a breaker or device shall be utilized for wire size No. 12. Sizes specified are AWG gauge for
No. 4/0 and smaller and circular mils (kcmil) for sizes larger than No. 4/0. Minimum wire size shall be No. 12.

B. Connectors: Make splices and connections in conductors using UL connectors.
1. Stranded Conductors: UL listed, solderless, bolted pressure or compression connectors. Connectors shall be of proper sizes to match conductor sizes.
2. Solid Conductors: UL listed, bolted pressure or spring connectors. Connectors shall be of proper sizes to match conductor sizes.
3. Motor Lead Pigtails: UL listed, crimp lugs with through-bolt fasteners between lugs. Lugs shall be of proper sizes to match conductors. Proper sized dies and tools shall be provided to apply connectors.
4. Lighting Fixture Taps: Electrical spring connectors as specified for solid conductors.
5. Ground connections: Burndy ground clamps or connectors of a type suitable for and having a UL listing for grounding applications.

C. All conductor sizes shown on the Drawings are copper unless specifically noted otherwise. All ground conductors shall be copper.

D. ?? [Aluminum] Aluminum conductors may be used for the following if the same or larger capacity of those copper conductors shown or specified and conduits sizes adjusted accordingly. Aluminum conductors shall be hi-compression type. All terminations shall utilize compression fittings. Conductors shall be torqued based on manufacturer's recommendation:
1. Service laterals
2. Panel/Switchboard distribution feeders 400 AMPS and larger terminating in switch gear, distribution panels, panelboards and transformers.
3. All grounds shall be copper.

2.09 MANUFACTURERS

A. Conduit (GRC, IMC, EMT)

1. Allied
2. Republic
3. Triangle
4. Wheatland

B. Conduit Fittings (GRC, IMC, EMT)
1. Appleton
2. O.Z. Gedney
3. Steel City
4. Thomas and Betts
5. Raco

C. Flexible Metal Conduit
1. AFC
2. Alflex
3. Anaconda
4. International Metal Hose

D. Liquidtight Flexible Metal Conduit
1. American Brass Company
2. Anaconda
3. Electri-Flex Company

E. PVC Conduit and Fittings
1. Thomas & Betts
2. Prime Conduit
3. Cantex
4. Certainteed
5. Triangle

F. Conductors, Copper, 600 Volts or less
1. American Insulated Wire
2. Cablec
3. General Cable
4. Pirelli
5. Southwire
6. Triangle

G. Conductors, Aluminum, 600 volt or less (where specified)
1. Alcan Cable
2. Cablec
3. Southwire

H. Outlets and Boxes
1. Appleton
2. Raco
3. Steel City
4. Midland

PART 3 - EXECUTION

3.01 CONDUIT

A. PVC (encased in 4" concrete on all sides) or Galvanized Rigid Steel (GRC) meeting corrosion resistant protection of NEC 300.6 shall be used for underground service entrance and underground feeders. When PVC is used, a transition to metal conduit shall be made below grade using GRC 90 degree fitting such that only metal conduit exits concrete or ground.

B. GRC or Intermediate Metal Conduit (IMC) shall be used where exposed and subject to physical damage or installed in damp or wet locations.

C. PVC shall be used for underground branch circuits, underground feeders where run below the slab on grade, 1" maximum in the slab on grade, 1" maximum in the slabs above grade, in concrete columns and concrete wall and in masonry walls.

D. PVC Schedule 80 (or GRC meeting corrosion resistant protection of NEC 300.6) may be used for direct burial for branch circuits only. When PVC is used, a transition to metal conduit shall be made below grade using GRC 90 degree fitting such that only metal conduit exits concrete or ground

E. Electrical Metalic Tubing (EMT) shall be used for branch circuits concealed in walls and ceilings. EMT may be used for feeders where not exposed to damage and/or not installed in wet or damp locations.

F. Flexible Metal Conduit shall be used for connections to rotating or vibrating equipment. The lengths shall be as short as possible, in no case longer than 6' or shorter than 12".

G. Liquidtight Flexible Metal Conduit shall be used for connections to rotating or vibrating equipment where located outdoors or in damp or wet locations. The lengths shall be as short as possible but in no case longer than 6' or shorter than 12". Liquidtight Flexible Metal Conduit shall NOT be located above a ceiling, in an air shaft or in a mechanical room utilized as a return air plenum.

H. Raceways shall be installed as a complete and total wiring enclosure system from outlet to outlet, to junction box, pull box, panel or cabinet prior to the installation of the conductors.

I. All conduit shall be run concealed (except in electrical, mechanical and similar area) unless shown otherwise. Where conduit is run exposed it shall be run in a neat and orderly manner. All conduit shall be run parallel and perpendicular to the building structure.

J. Conduits shall be secured to all boxes, cabinets, panels and equipment with locknuts and bushings and shall be securely fastened in place on intervals required by the Code and local codes; hangers, supports or fastenings shall be provided at each elbow and at the end of each straight run within 3' of a termination to a box or cabinet. All supports shall be independent and shall not use ceiling supporting system wires.

K. Use threaded rods and hangers for supporting single conduit. Multiple conduits shall be supported using a trapeze of Unistrut (or Kindorf) channels and threaded rods with double nut/washer.

L. Provide pullboxes as shown and/or as required by Code and where necessary in the raceway system to avoid excessive runs or too many bends. Boxes shall have removable hinged or screw covers and shall be accessible.

M. The minimum size conduit shall be ½" diameter. Homeruns shall extend from the first outlet or device to the panel designated and shall be a minimum ¾" diameter.

N. Provide non-hardening elastic type duct seal compound for each conduit entering the building from the outside and from one space to another having a normal operating temperature differential greater or less than 10 degrees F.

O. Provide seals around all conduit and sleeves penetrating through walls, partition or ceilings. Provide UL approved fire-resistant seal around all penetrations through fire rated barriers to maintain the barrier rating.

P. Provide pull wire or nylon rope in all empty conduits.

3.02 CONDUIT PROTECTION

A. Provide underground conduit with a top cover at least 30" below finished grade and no more than 48".

B. Mark all duct bank runs with a detectible warning tape specifically formulated for prolonged use underground, resistant to alkalis and acids found in soil, installed no less than 8 inches and no more than 12 inches above the top of the duct bank concrete. Place warning tape along the approximate center line of the duct bank run. Warning tape shall be permanent, red in color, continuous printed, aluminum backed tape, compounded for direct burial not less than 3 inches wide and 4 mils thick. Printed legend shall be indicative of general type of underground line below.

C. Mark all underground conduit runs with a detectible warning tape specifically formulated for prolonged use underground, resistant to alkalis and acids found in soil, installed no less than 6 inches and no more than 10 inches above the top of the conduit. Place warning tape along the approximate center line of the conduit run. Warning tape shall be permanent, red in color, continuous printed, aluminum backed tape, compounded for direct burial not less than 3 inches wide and 4 mils thick. Printed legend shall be indicative of general type of underground line below.

D. Future

3.03 CONDUCTORS – 600 VOLTS OR LESS

A. No conductor shall be smaller than No. 12 except for signal or control circuits.

B. All conductors shall be installed in conduit.

C. Where a connection is made to any terminal of 40 amperes or more and/or conductors No. 8 or larger, copper terminal lugs shall be bolted to the conductors. Where multiple terminal lugs are made, individual lugs for each conductor shall be used. Where aluminum conductors are accepted in this Section or noted on the drawings, the terminations shall be made with high compression lugs as manufactured by Ideal or MAC.

D. A maximum of six (6) current carrying conductors shall be run in a conduit. The neutral shall be considered a current carrying conductor.

E. For homeruns of 120 Volt, 20-amp circuits, where the length of run from the panelboard to the center of the load exceeds 100'-0" the conductors shall be No. 10 minimum. If that length exceeds 200'-0" the conductors shall be No. 8 minimum.

F. For homeruns of 277 Volt, 20-amp circuits where the length of run from the panelboard to the center of the load exceeds 200'-0" the conductors shall be No. 10 minimum.

G. Multiple branch circuits homeruns serving computer loads, electronic lighting ballasts and/or H.I.D. lighting ballasts shall utilize a neutral conductor one trade size larger than the phase conductors or use separate neutrals for each circuit. Neutral conductors for individual branch circuits may be the same size as the phase conductor but not less.

H. Provide an equipment grounding conductor in all feeder and branch circuit conduits. Size per code unless shown otherwise.

I. Conductors shall have color coded jackets the entire length for sizes No. 6 and smaller. The conductors for sizes No. 4 and larger shall have color coded jackets the entire length. Colors shall be as follows:

| 120/208 Volt System | 277/480 Volt System |
|---|---|
| Phase A – Black | Phase A – Brown |
| Phase B – Red | Phase B – Orange |
| Phase C – Blue | Phase C – Yellow |
| Feeder or Shared Neutral – White | Feeder or Shared Neutral - Gray |
| Branch Phase A Neutral – White w/ Black Stripe | Branch Phase A Neutral – White w/ Brown Stripe |
| Branch Phase B Neutral – White w/ Red Stripe | Branch Phase B Neutral – White w/ Orange Stripe |
| Branch Phase C Neutral – White w/ Blue Stripe | Branch Phase C Neutral – White w/ Yellow Stripe |
| Ground - Green | Ground - Green |

J. Where phase marking tape is used it shall be wrapped 2" wide and located at two (2) locations 6" and 18" from the termination. Phase marking tape for the neutral and grounding conductors shall be provided where visible at any point where the conductor is accessible.

K. Before pulling any wire into conduit, thoroughly swab the conduit and clean the boxes of debris.

L. Run feeders in continuous lengths, without joints or splices. Joints shall occur in branch circuits only in locations where they divide.

M. Run conductors for emergency power in conduits separate from all other wiring.

N. Bundle conductors in switchboards and panelboard cabinets and similar using nylon straps made for the purpose. Conductors No. 8 and larger shall be bundled in individual circuits.

3.04 JUNCTION BOXES, PULL BOXES, AND OUTLET BOXES

A. All junction boxes and pullboxes shall be sized in accordance with the Code.

B. All boxes shall be rigidly secured in position to building structure. Boxes larger than 4" shall be secured at two points.

C. Outlet boxes shall be flush with the finished wall or ceiling, or not more than ¼" back, unless specifically shown as surface mounted or its purpose is to be above the ceiling.

D. Provide galvanized steel or cast type outlet boxes. Where exposed GRC or IMC terminates in a box, provide cast box with threaded hubs.

E. All boxes shall be provided with a cover plate.

F. All outlet boxes shall be mounted vertically unless noted otherwise.

G. Where outlets are shown at the same location but at different heights, they shall be mounted one above the other along the same centerline.

H. The exact mounting height of an outlet may be adjusted slightly to align with masonry joint where approved by the Architect.

I. Verify outlet locations in finished spaces with Drawings of interior details and finishes.

J. Outlets shall NOT be located back to back. Where outlets are shown on opposite sides of a wall, they shall be located in separate stud spaces.

K. Protect floor boxes from entering debris during construction using temporary covers approved by the floor box manufacturer.

L. Provide barriers in outlet boxes for switches separating different phases for voltages exceeding 150 volts to ground.

M. Boxes shall not be supported from a suspended ceiling.

END OF SECTION 260500

# SECTION 260526 - GROUNDING SYSTEMS

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Provide all equipment, materials, tools, and labor to provide a complete grounding system.

B. Ground all metallic parts of the electrical system which are not intended to carry current such as conduit, busduct, switchgear, panelboards, cabinets and enclosures, motor frames, device boxes, etc., in accordance with the NEC and applicable codes.

C. In non-metallic conduits, maintain continuity of equipment grounding by installing an insulated grounding conductor and connected by an acceptable method.

## PART 2 - PRODUCTS

### 2.01 GENERAL

A. All equipment and materials provided under this Section of the Specifications shall be new, UL listed, and bear the UL label.

B. All switchboards, panelboards, motor control centers, transformers, busway, etc. shall be provided with a copper equipment ground bar bolted, brazed, or riveted to the associated enclosure or cabinet. All receptacles, switches, disconnects, individual motor controllers, etc. shall be provided with a grounding terminal connected to the device frame or enclosure.

C. All conduit, cable tray, manufactured wiring systems, raceways, junction boxes, pull boxes, etc. shall be made electrically continuous by means of grounding conductors, bonding jumpers, grounding bushings, etc. as required by the NEC and the authorities having jurisdiction.

D. Refer to other Sections for additional grounding requirements.

### 2.02 GROUNDING CONDUCTORS

A. All grounding electrode conductors shall be bare or green insulated copper conductors sized per the NEC, unless noted on the Drawings. Where the authorities having jurisdiction or local code requires grounding electrode conductor sizing in excess of that shown on the Drawings or specified herein, the larger size conductor shall be installed.

B. All equipment grounding conductors shall be green insulated copper conductors sized as indicated on the Drawings. Where the authorities having jurisdiction or local code requires equipment grounding conductor sizing in excess of that shown on the Drawings or specified herein, the larger size conductor shall be installed.

C. All bonding conductors shall be flexible copper bonding jumpers sized in accordance with the NEC for grounding electrode conductors.

2.03 GROUND RODS

A. All ground rods shall be a minimum of ¾" x 10'-0" copper clad steel unless otherwise indicated on the Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide adequate and permanent service neutral and equipment grounding in accordance with the NEC and as follows.

B. Each system of electrically continuous metallic piping and ductwork shall be electrically grounded in accordance with the requirements of the NEC for "bonding" as they apply to the "bonding of piping systems". Isolated metallic piping and duct systems shall be bonded to the building equipment grounding system.

C. Bonding and grounding conductors shall be sized, shall be run in conduit, and shall be connected to various services in accordance with the requirements of the authorities having jurisdiction and the NEC.

D. Grounding Electrode System
1. Provide a made electrode consisting of three (3) ground rods spaced 6' apart in the form of an equilateral triangle. Each rod shall be installed a minimum of 12" below finished grade and a minimum of 36" clear of the foundation with No. 3/0 bare stranded copper conductors bonded together 24" below finished grade to form a loop (grounding triad). Provide an accessible underground rod test well for each ground rod.
2. Extend from the made electrode a No. 3/0 insulated stranded copper conductor in a 1 1/4" conduit to a single point ground bar (Erico EGBA144**GG Length as required) at each main service disconnect and connect to the main disconnect neutral bar, housing and frame using No. 3/0 stranded conductor.
3. Provide a building grounding riser as follows:
    a. Provide a single point ground bar in the main electrical room connected to the made electrode and each service main disconnect with a No. 3/0 insulated stranded copper conductor in a 1" conduit.
    b. Provide a ground bar (Erico EGBA14412GG) in each branch electrical room connected to the ground bar in the main electrical room with a 250kcmil insulated stranded copper conductor in a 1 ½" conduit.
    c. Provide a ground bar (Erico TGBA 16L08PT) in each communications room (and other rooms as noted on the Drawings) connected back to the closest electrical room ground

bar on the same floor with a #2 insulated stranded copper conductor in a 1" conduit.

5. The following electrodes shall be bonded together with a No. 3/0 insulated stranded copper conductor in 1" conduit to form a grounding electrode system:
   a. Made electrode described above.
   b. Underground main metallic water pipe. Connect ahead of the first valve and provide a bonding jumper across the water meter.
   c. Structured steel building frame.
   d. Where the above electrodes are not available or feasible, provide suitable grounding electrodes per NEC.
6. Where nonmetallic insulating coupling, dielectric flanges or similar are used in metallic water piping, provide a No. 3/0 insulated stranded copper conductor across the couplings with the conductor attached to the water line with clamps on each side of the coupling.
7. Provide exothermic type chemical welded type connectors (Cadweld or approved equal) for the joining of conductors to ground rods, grounding plates and splicing. Provide compression and bolted type connectors for the joining of grounding electrode conductors to the ground bars.
8. Provide a separate green-insulated equipment grounding conductor, with insulation of the same rating as the phase conductors, for all feeders and branch circuits. Install the grounding conductors in the raceway with related phase and neutral conductors. Where parallel conductors in separate raceways occur, provide a grounding conductor in each raceway. Connect all grounding conductors to ground terminals at each end of the run so that there will be no uninterrupted grounding circuit from the point of ground fault back to a point of connection of the equipment ground and system neutral.
9. Connect the secondary neutral point and the enclosure in each dry type transformer together and run a grounding electrode conductor from their common point of connection to the building grounding electrode system.
10. Provide grounding bushings on all raceways terminating within all electrical enclosures. Provide grounding conductors from such bushings to the frame of the enclosure, ground bus and equipment grounding strap where one occurs.
11. Connect the unit substation neutrals where applicable and equipment ground to a common point within the metallic enclosure containing the main service disconnecting means. Equipment grounds and the identified neutral of the wiring system shall not be interconnected beyond this point in the interior wiring system.
12. Assure the electrical continuity of all metallic raceway systems, pulling up all conduits and/or locknuts wrench tight. Where expansion joints or telescoping joints occur, provide bonding jumpers. Wherever flexible metallic conduit is employed, provide a green insulated ground jumper installed in the flexible conduit.
13. Provide an insulated green bonding jumper from the grounding screw in the outlet box. Do not install behind the device mounting screws.
14. Provide a No. 6 copper ground to the telephone company main distribution frame and to each telephone backboard.

3.02 TESTS

A. Provide ground continuity tests at all switchboards, transformers, panel boards, distribution panels, motor control centers, main disconnects and transfer switch equipment.

B. After completion of the grounding system measure the system ground resistance. If the resistance to ground exceeds 5 ohms, additional ground rods, or other method approved by the Engineer, shall be provided until a reading of 5 ohms or less is achieved.

C. Perform tests in dry weather and not less than 48 hours after rainfall.

D. Test instruments: Null balance type, Biddle Meggar Earth Tester or approved equal.

E. Provide a report with all resistance readings, calculations and performed corrections and submit two (2) copies to the Architect.

END OF SECTION 260526

# SECTION 260550 - ELECTRICAL IDENTIFICATION

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Provide all equipment, materials, tools and labor to properly identify electrical equipment and related accessories.

B. Provide identification for the following:
1. Switchgear, switchboards, distribution panels, panelboards, disconnect switches, circuit breakers, motor starters, motor control switches, start/stop buttons, EPO switches, and other electrical equipment.
2. Junction boxes and pullboxes.
3. Wiring devices.
4. Wiretags for wiring.
5. Raceways.

C. Related Section
1. 26 24 00 – Service and Distribution.
2. 26 27 00 – Devices.
3. 26 29 00 – Motor Controls and Wiring.

## PART 2 - PRODUCTS

### 2.01 IDENTIFICATION

A. Nameplates
1. Nameplates shall have the surface color and core color for engraved letters as follows:
   a. Normal distribution
      1) 277/480V. equipment – white surface with black core
      2) 120/208V. equipment – black surface with white core
   b. Emergency distribution
      1) 277/480V. equipment – white surface with red core
      2) 120/208V. equipment – red surface with white core
2. Provide a nameplate for each switchgear, switchboard, panelboard, distribution panel, motor starter, disconnect switches, motor control center and similar distribution equipment clearly identifying the equipments' name to match that indicated in the Drawings.
3. Provide a nameplate for each feeder protective device in each switchgear, switchboard, distribution panel, motor control center and any other similar equipment. Identify the specific load it serves.
4. Nameplates shall be bakelite, 1/16" thick minimum with 3/8" high letters.

B. Junction Boxes and Pull boxes
1. Provide identification with permanent ink marking pen on the cover of junction boxes noting the branch circuits and systems within the conduit.
2. Pullboxes shall be marked using stenciled paint noting the voltage and systems served. Letters shall be appropriate height so that they can be read from the floor.

3. Boxes containing Emergency systems: write the abbreviation "EMER" above the circuit number on junction box covers. Write "EMERGENCY" in stenciled "RED" paint on pullboxes above other markings.

C. Disconnect switches and motor starters
1. Provide nameplates as described above for all disconnect switches and motor starters located 8'-0" above finished floor or less. Identify equipment served.
2. Provide identification with permanent ink marking pen on all disconnect switches and motor starters mounted over 8'-0" above finished floor. Write marking clearly and in a location that can be read from the floor when the area is finished (e.g. marking for disconnects serving mechanical equipment that will be above the ceiling when the area is finished shall be located on the bottom or bottom front of the disconnect so it can be read when a ceiling tile is removed).

D. Wiring device wall plates
1. For critical care outlets in health care facilities provide identification on the face of the coverplate with red printed lettering on a white adhesive background as to the panel and circuit the outlet is served. Characters shall be ¼" high.

E. Push button switches
1. Provide nameplates as described above for all push button switches. Letters shall be ¼" high.

F. Emergency power off buttons (EPO)
1. Provide nameplates as described above for EPO switches. Nameplate shall have a red surface and a white core. The letter shall be ½" high reading "EMERGENCY POWER OFF".

G. Wire markers
1. Wire markers for identification of wiring shall be self-adhesive type having letters and numerals indicating feeder or branch circuit number. Locate markings on wiring where visible near the terminations and taps in all junction boxes, outlet boxes, panelboards, distribution panel boards, switchboards and motor control centers.

H. Electrical services
1. Where multiple electrical services are provided to a building, provide nameplates as described above identifying the appropriate service number. Letters shall be 1" high.
2. Where the multiple electrical services are in different locations, provide a nameplate at each service noting the locations of the other service(s) as required by the NEC and the AHJ.

PART 3 - EXECUTION

A. Nameplates shall be applied to a cleaned surface and shall be plumb and level.

END OF SECTION 260550

# SECTION 262400 - SERVICE AND DISTRIBUTION – 600 VOLT

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Provide all distribution switchgear as specified herein, as indicated on the Drawings and as required to provide a complete and operating system. All distribution equipment shall be of the same manufacturer including, but not limited to, switchboards, panelboards, transformers, disconnects, and busway.

B. The distribution equipment shall be designed, manufactured and tested in accordance with the latest version of the following standards:
1. NFPA 70
2. NEMA AB1
3. NEMA KS1
4. NEMA PB2
5. NEMA PB1
6. NEMA PB1.1
7. NEMA PB2.1
8. NEMA PB1.1
9. NEMA 250
10. NEMA TP-1-2002
11. ANSI/IEEE C12.1
12. ANSI C39.1
13. ANSI C57.13
14. UL 50, 67, 89, 98, 489
15. ASTM

C. Provide nameplates for all distribution equipment as specified herein and per Section 26 05 50.

### 1.02 SUBMITTALS

A. The following data shall be submitted according to Section 01 33 00 and Section 26 01 00 and shall include but not be limited to:
1. Physical dimensions, nameplate data, voltage, amperage, plan views, elevations, schematic wiring diagrams, bus capacities, circuit schedule, short circuit ratings, etc.
2. The switchgear manufacturer shall provide a coordination study with settings of all over current protective devices. Over current protective devices shall befully rated.
3. Over current protective devices serving life safety systems and elevators shall be fully rated with selective coordination when applied in series with other devices.
4. The switchgear manufacturer shall provide an ARC Flash study. Provide labels on all switchboards, panels, and other electrical equipment as required per NEC 110.16.
5. The ARC flash and coordination studies shall be performed in SKM software. A working SKM file shell be provided as part of the study so the owner can update study in the future with SKM software.

B. A ¼" scale dimensioned floor plan shall be provided with the switchgear submittals for all equipment rooms identifying actual size, clearance, access and spacing of the electrical equipment.

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect, and handle products in conformance with manufacturer's recommended practices as outlined in application installation and Maintenance Manuals.

B. Each switchboard section shall be delivered in individual shipping splits for ease of handling. They shall be individually wrapped for protection and mounted on shipping skids.

C. Inspect and report concealed damage to carrier within their required time period for repair or replacement.

D. Store in a clean, dry space. Maintain factory protection and/or provide an additional heavy canvas or heavy plastic cover to protect structure from dirt, water, construction debris, and traffic. Where applicable, provide adequate heating within enclosures to prevent condensation.

E. Handle in accordance with NEMA PB 2.1 and manufacturer's written instructions. Lift only by lifting means provided for this express purpose. Handle carefully to avoid damage to switchboard internal components, enclosures, and finish.

1.04 ELECTRICAL SERVICE

A. Provide and install the building electrical service from the Power Company transformer(s) to the main service distribution equipment as shown on the Drawings. Any charges required by the Power Company for permanent power shall be included in this Contract.

B. Coordinate all installation requirements with the Power Company prior to bid and include all trenching, conduits, vaults, equipment pads, current transformers, potential transformers, potential taps as required. Coordinate all Work with the Power Company.

C. Provide conduit, C.T. enclosures, switchgear metering compartments, etc. as required by the Power Company for metering. Contractor shall coordinate all meter requirements with the Power Company prior to proceeding with this Work.

D. The secondary service to the building shall be 120/208 volts, 3 phase, 4 wire, 60 Hertz AC.

E. Provide (1) 1" conduit from each power company transformer to the telephone room and main service distribution equipment for pulse metering interface if available.

PART 2 - PRODUCTS

2.01 NOT USED

2.02 PANELBOARDS

A. System Description
1. Short circuit rating of panelboards shall be the interrupting rating of lowest rated device in the panel or application UL series for proper main and branch device combinations.
2. Panelboards shall have a maximum of 42 protective devices per panel, including sub-feeders and excluding main overcurrent protective devices. For more than 42 devices, 2 or more panelboards are required.
3. With 2 or more panelboards, sub-feed lug or thru-feed lugs shall be used in all by 1 section of each panelboard. Lugs shall have same capacity as incoming mains.
4. Protective devices shall be molded case circuit breakers.

B. Enclosure
1. Boxes shall be a nominal 20 inches wide and 6 inches deep with wire bending space per the National Electric Code.
2. Fronts shall be door-in-door construction reinforced steel with concealed hinges and concealed trim adjusting screws. Trim clamps are unacceptable.
3. All door locks shall be corrosion proof Valox (or equal) with retractable latches. All door locks shall be keyed for a single key.
4. Clean Lexan (or equal) directory card holders shall be permanently mounted on front door.
5. All panelboard series ratings shall be prominently displayed on dead front shield.
6. Interiors shall permit top or bottom incoming cables.

C. Bus bars
1. Bus bars shall be copper, phase sequenced, fully insulated and supported by high impact Noryl (or equal) interior base assemblies.
2. Bus bars shall be mechanically supported by zinc finished galvanneal steel frames to prevent vibration and damage from short circuits.
3. Terminations shall be UL tested and listed and suitable for UL copper.
4. Provide 1 continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors for bolt-on branch circuit breakers. Bus bars shall be rated as indicated in Drawings.
5. Split solid neutral bus shall be plated and located in main compartment for all incoming neutral cables to be same length. 200% rated solid neutral shall be provided as indicated on the Drawings and shall be plated copper for non-linear load applications subject to harmonics. 200% rated solid neutral shall be self-certified by Manufacturer.
6. Lugs shall be rated for 75 degree C terminations.
7. Interiors shall be field convertible for top or bottom incoming feed. Main and sub-feed circuit breakers shall be vertically mounted. Main lug interiors up to 400 amperes shall be field convertible to main breaker. Interior leveling provisions shall be provided for flush mounted applications.
8. Log bodies shall bolt in place.

D. Circuit Breakers

1. Molded case circuit breakers shall be bolt-in devices for 120/208V panels and 277/480V panels.
2. All circuit breakers shall have thermal and magnetic trip elements in each pole.
3. Multiple pole breakers shall have internal common trip crossbars for simultaneous tripping of each pole.
4. Circuit breakers shall not be restricted to any mounting location due to physical size.
5. All branch breakers 15 to 100 amperes shall be able to be mounted in any panel position for twin or double mounting without space penalty. Sum of ratings for 2 such twin mounted devices shall not exceed 180 amperes.
6. Main and sub-feed circuit breakers may be vertically or horizontally mounted.
7. Branch breaker panelboard connections shall be copper to copper.
8. All panelboard terminations shall be rated as indicated in Drawings.
9. All breakers shall have an over center mechanism and be quick make and quick break.
10. All breakers shall have handle trip indication and a trip indicator in window of circuit breaker housing.
11. Breaker handle and faceplate shall indicate rated ampacity.
12. Circuit breaker escutcheon shall have standard ON/OFF markings.
13. Main breakers shall be UL listed for use with: Shunt, Under Voltage, and Ground Fault Shunt Trips; Auxiliary and Alarm Switches; and Mechanical Lug Kits.
14. Branch breakers shall be UL listed for use with: Shunt Trips, Auxiliary and Alarm Switches.

E. Finish
1. Boxes shall be corrosion resistant, zinc finish galvanneal.
2. Fronts shall be powder finish painted ANSI 61 gray.

F. Panels shall be manufactured by ABB-GE, Square D, Cutler-Hammer or Siemens.

2.03 DISTRIBUTION PANELBOARDS

A. System Description
1. Equipment shall be indoor deadfront power panelboards for molded-case circuit breakers.
2. Panelboards shall meet service entrance equipment where indicated on the Drawings.
3. Panelboards shall have integrated short circuit rating. Fully rated panel rating is that of lowest rated device in panelboard. Series ratings are for the UL tested main-branch combination.

B. Enclosures
1. Panel box shall be galvanized code gauge sheet steel with removable end walls.
2. Enclosures shall be surface mounted.

C. Fronts

1. Provide a four-piece front to cover wiring gutter and wiring access areas. Provide a lockable hinged door with semi-concealed hinges to cover access to circuit breakers.
2. Hinged door fronts, when specified, shall be provided with a lockable inner door with leaf hinges. An inner door shall cover the circuit protective devices and shall be able to be locked.
3. Door hinges shall be continuous piano hinges, welded to door(s) and bolted on front.
4. Door locks shall be Yale #511.

D. Interiors
1. Panelboard interior shall by symmetrically designed and assembled such that circuit protective modules are connected onto bus bar with positive gripping jaw assemblies and locked pressure connections.
2. Circuit-protective modules shall be designed for removal or replacement without disturbing adjacent protective devices and without removing main bus and branch circuit connections.
3. Interiors shall allow installation of molded-case circuit breakers in same panelboard.
4. Lugs shall be UL listed to accept solid or stranded copper cables. Lugs shall be bolted in place.
5. Panelboards shall be rated as indicated in Drawings. Main devices shall have maximum rating of 1200 amperes.
6. Panelboards shall have flat, stacked, vertically aligned bus bars.
7. Bus bars shall be copper. The bus bars shall have sufficient cross-sectional area to meet UL 67 temperature rise requirements through actual tests. The bus bars shall be standard density rated for 1000 amperes per square inch.
8. Bus bars shall be phase-sequenced and rigidly supported by high impact resistant, insulated bus supporting assemblies to prevent vibration or short circuit mechanical damage.
9. Neutral bus shall be fully rated and able to be located in either corner of enclosure at line end to facilitate conductor termination. Provide 200% rated neutral bus, if required by plans or another specification section.
10. All solderless terminations shall be suitable for copper UL listed wire or cable and shall be tested and listed in conjunction with appropriate UL standards. Terminations shall be rated for use with conductor ampacity as assigned in the NEC 75 degree C table.
11. Ground wire terminations shall be provided as an optional kit for installation by panelboard installer without voiding UL label.

E. Main and Branch Devices
1. Circuit breakers
    a. Main and branch circuit breaker shall be quick-make, quick-break, and trip indicating, low voltage molded-case.
    b. Circuit breaker case shall have ON/OFF and International I/O position indicators.
    c. Breaker faceplate shall list current rating, UL and IEC certification standards, and AIC ratings.
    d. Circuit breakers shall be factory sealed and shall be date coded on breaker case.

e. Breakers shall be UL listed for reverse connection without restrictive line or load markings. Circuit breakers shall be able to mount in any operating position.
f. 3-pole breakers with ampere ratings greater than 150 amperes shall have rating plugs.
g. All circuit protective devices shall have the following minimum symmetrical current interrupting capacity of 18kA. Interrupting rating of breakers shall not be less than maximum short circuit current available at incoming line terminals as shown on plans.
h. Breakers shall have UL listed series ratings, if specified in Drawings.
i. Main breakers and lugs shall be convertible by installer for top or bottom incoming feed.
j. Where indicated on the drawings, elsewhere in the specifications, or as required for coordination, the main breaker shall be provided with integral ground pick-up and delay settings and adjustable long time, instantaneous and short time settings.
k. All main breakers and feeder breakers 1200A or larger shall be connected to an energy reducing maintenance switch with indicator light. Device shall comply with NEC Article 240.87.

F. Series Ratings
1. Panelboard series-connected ratings shall be attached to the panelboard enclosure.

G. Distribution panels shall be manufactured by ABB-GE, Square D, Cutler-Hammer or Siemens.

2.04 TRANSFORMERS

A. System Description
1. Power transformers shall be 2 winding dry type for general power and lighting applications. Transformers rated 1000 KVA or below shall be UL listed, DOE 2016 efficiency standard, and bear required UL Listing Mark.

B. Dry-type general purpose transformers shall be rated as indicated in Drawings.

C. Transformers shall use properly classified UL approved temperature ratings. Temperature rise ratings shall be in accordance with UL 506. ??Insulation ratings shall be as indicated in Drawings.??

D. Transformers shall be UL recognized 200 degree insulation system and shall be designed so that under full load the average conductor temperature rise does not exceed 115 degrees C rise above a 40 degree C ambient and the enclosure does not exceed a 50 degree C rise at any point.

E. Transformers 5 KVA and above shall be able to meet ANSI/IEEE C57.96 daily overload requirement listed in Drawings. Transformers loaded in accordance with this paragraph shall be capable of long service life under thermal conditions specified. There shall be no need for derating.

F. Transformers shall have sound levels equal to or lower than those established in latest revision of ANSI/IEEE C89.2 as shown in drawings.

G. Enclosures shall meet UL 506 requirement for the following characteristics:
1. Ventilation Openings;
2. Corrosion Resistance;
3. Cable Bending Space;
4. Surface Temperature Rise;
5. Wiring Compartment Temperature Rise;
6. Terminations;

H. Transformer Construction
1. Transformer cores shall be constructed of high grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Magnetic flux densities shall be kept well below core saturation point. Core laminations above 112.5 KVA shall be miter cut at core corners to reduce hot spots, core loss, current and sound level. Core laminations shall be clamped together with steel angles. Cores for transformers above 300 KVA shall be clamped using insulated bolts through core laminations to provide proper pressure throughout core length. Completed core and coil shall be bolted to enclosure base and isolated from base by rubber vibration-absorbing mounts. There shall be no metal-to-metal contact between core and coil and enclosure. Sound isolation systems requiring complete removal of all fastening devices is not acceptable.
2. Transformer core shall be visibly grounded to enclosure by flexible grounding conductor meeting UL and NEC size requirements.
3. Enclosure shall be constructed of heavy gauge steel.
4. Coils shall be copper.

I. Load Taps
1. Transformers shall have following high voltage load tap arrangements unless noted otherwise in plans:
a. Through 2 KVA – no taps;
b. Through 23 KVA – no taps;
c. 3 though 23 KVA 2 above, 2 below nominal 4, 2-1/2 percent taps voltage;
d. Through 500 KVA – 6, 2-1/2 percent taps, 2 above, 4 below nominal voltage.

J. Finish
1. Finish shall consist of degreasing, phosphate cleaning, and electrodeposits ANSI gray enamel paint.

K. Transformers – standard shall be as manufactured by ABB-GE or Square D, Cutler-Hammer or Siemens.

2.05 BUSWAY (NOT USED)

2.06 DISCONNECT SWITCHES

A. Switches shall be heavy-duty type. The switch blades shall be visible when the switch is OFF, and the cover is open. Lugs shall be front removable, and UL listed

for 75 degrees C conductor. Provide removable arc suppressor to facilitate easy access to line side up.

B. Switches shall have provisions for a field installable electrical interlock.

C. The switch operating mechanism shall be quick-make, quick-break.

D. Provide padlock provisions for locking in the OFF position.

E. Provide NEMA type enclosure suitable for the application (indoor, outdoor, wet or damp, corrosive, etc.). Type 3R enclosure shall contain no knockouts (supply watertight hubs).

F. Enclosure shall have ON and OFF markings stamped on the enclosure.

G. Switches shall be horsepower rated.

H. Fused disconnect switches shall have rejection type fuse clips with dual element current limiting fuses of rating shown or required by the Manufacturer's nameplate of the equipment being supplied. The UL short circuit rating shall be 200,000 amps RMS SYM when used with Class R or J fuses.

2.07 FUSES

A. Fuses shall have 200,000 Amp RMS SYS rating.

B. Fuses for circuits 1 to 600 amperes shall be dual element, current limiting time delay (500% of rated current for minimum of 10 seconds) with separate overload and short circuit clearing chamber. Bussman "Low Peak" or equal by Littlefuse or Ferraz Shawmut. UL Class J.

C. Fuses for circuits above 600 amperes shall be current limiting, time delay (500% of rated current for minimum of 4 seconds, clear 20 times rated current in 0/1 seconds or less). Bussman, "Hi-Cap" or equal by Littlefuse or Ferraz Shawmut. UL Class L.

D. Provide one (1) set of spare fuses for each set of three (3). A maximum of three (3) sets of fuses is required to be provided for the same type and rating.

PART 3 - EXECUTION

1.01 GENERAL

A. Clean all enclosures free of all foreign matter and dust.

B. Remove all rust marks and repaint to new condition.

C. Provide all necessary hardware to level and secure all switchgear.

D. Provide engraved nameplates on all switchgear per Section 26 05 50 including but not limited to, switchboards, switchboard overcurrent protection devices, panelboards, distributor panelboards, disconnects, contactors, busway, busplugs.

E. Provide a typewritten directory for all panelboards. Make spares in pencil.

1.02 FIELD TESTING

A. Infra-red Testing

1. After the electrical distribution system has been checked, adjusted, calibrated and under load just prior to substantial complete, it shall be subjected to an infra-red thermograph test by a NETA certified technician. The test shall be performed with a minimum load of 20% of the rating of the equipment/connection being tested. Load banks shall be supplied if necessary, to provide this load factor.
2. Two (2) copies of the test report shall be provided to the Engineer upon completion of the test. Connections indicated having higher temperatures than acceptable shall be tightened or corrected as required. After corrections have been made, the connections shall be subjected to an additional thermograph test and rechecked to confirm the problem has been corrected.
3. The following components and connections shall be included in the thermograph testing:
   a. Service entrance
   b. Switchboards
   c. Switchboard main and feeder devices
   d. Feeder taps
   e. Busway cable terminations
   f. Busway joints
   g. Bustaps and busplug connections
   h. Emergency distribution system
   i. UPS system
   j. Motor control centers
   k. Distribution panels
   l. Panelboards
   m. Mechanical equipment connections (over 100 amps)
   n. Transformers

END OF SECTION 262400

# SECTION 262700 - DEVICES

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Provide all devices specified herein, as indicated on the Drawings and as required to provide complete and operating systems.

B. The wiring devices shall be designed, manufactured and tested in accordance with the latest version of the following standards:
1. NEMA WD-1
2. NEMA WD-5
3. Underwriters Laboratories
4. NEC

## PART 2 - PRODUCTS

### 2.01 GENERAL

A. The color of all devices, wall plates and coverplates shall be as selected by the Architect.

### 2.02 SWITCHES

A. Wall switches, unless noted otherwise, shall be flush mounted, commercial grade 120/277-volt, 20-amp, toggle switches:
1. Single Pole: Leviton No. 1221 Series or equal by Hubbell, P&S or Cooper
2. Double Pole: Leviton No. 1222 Series or equal by Hubbell, P&S or Cooper
3. 3-way: Leviton No. 1223 Series or equal by Hubbell, P&S or Cooper
4. 4-way: Leviton No. 1224 Series or equal by Hubbell, P&S or Cooper

B. Dimmer switches, unless specified otherwise in the Drawings or by the Architect, shall be Lutron Nova T-star series with wattage and type as required by the load and color/finish as selected by the Architect. Provide 3-way and 4-way dimmers where multiple dimmers as shown to control the same lights. Where on/off switches are indicated adjacent to dimmer switches they shall be ganged together, and the on/off switches shall also be Lutron Nova T-star series to match the look of the dimmer switches.

C. Motor rated switches and switches indicated as pilot switches, unless noted otherwise, shall be flush mounted industrial grade, red pilot light "on" with overload protection as follows (note: wire per manufacturers recommendation):
1. 120V, 20-amp Circuits – Hubbell HBL1221PL
2. 277V, 20-amp Circuits – Hubbell HBL1221PL
3. 120V, 30-amp Circuits – Hubbell HBL3031PL

D. Key switches, unless noted otherwise, shall be flush mounted, commercial grade, 120/277V, 20 amp:
1. Single Pole: Leviton No. 1221-2L Series or equal by Hubbell, P&S or Cooper

2. Double Pole: Leviton No. 1222-2L Series or equal by Hubbell, P&S or Cooper
3. 3-Way: Leviton No. 1223-2L Series or equal by Hubbell, P&S or Cooper
4. 4-Way: Leviton No. 1224-2L Series or equal by Hubbell, P&S or Cooper

E. Wall switches behind house areas, unless noted otherwise, shall be commercial grade 120/277-volt, 20-amp, toggle switch Leviton No. 1221 Series or equal by Hubbell, P&S or Cooper.

F. Timer switches, unless noted otherwise, shall be digital time switch 24VAC or 120/277VAC as required. Timeout adjustments from 5 minutes to 12 hours. Set timer in the field to 4 hours for equipment rooms and 30 minutes for all other areas. For timer setting greater than 2 hours select the visual flash option and audible sound option. Color shall match that selected for the switches unless noted otherwise.

G. Wall mounted motion sensors, unless noted otherwise, shall be Wattstopper WS-250 for wall mounted at switch height and Wattstopper CI-200 for ceiling mounted. Provide power packs, relays, etc. as required to provide a complete system in each area. Color as selected by Architect. Adjust interval to 15 minutes at project completion unless noted otherwise. (Coordinate sensor type with lighting ballasts and provide accessories as required). Approved equal by Leviton or Cooper.

2.03 RECEPTACLES

A. Receptacles shall be plastic, 2P, 3W, grounded as follows:
1. Duplex receptacles - for multi-outlet circuits, 125-volt, 15-amp rating Leviton 5262 Series or equal by Hubbell, P&S or Cooper
2. Duplex receptacles - for dedicated, single-outlet circuits, 125-volt, 20-amp rating Leviton 5362 series or equal by Hubbell, P&S or Cooper
3. Duplex isolated ground receptacle -125-volt, 20-amp rating Leviton 5362-IG series (provide color alternate of color for standard receptacles as selected by Architect) or equal by Hubbell, P&S or Cooper.
4. Simplex (single) receptacles -125-volt, 20-amp rating Leviton 5361 series or equal by Hubbell, P&S or Cooper

B. Ground Fault Interrupter Receptacles (GFCI) shall be plastic, 2P, 3W, 125-volt, 20-amp, self-protecting type Leviton 7899 series or equal by Hubbell, P&S or Cooper. Hospital GFCI receptacles shall be Leviton 7898-HG or equal by Hubbell, P&S or Cooper.

C. Weather receptacles shall have a duplex GFCI receptacle as specified above with a gasketed extra-duty in-use weatherproof cover plate T&B CKLSVU or approved equal by P&S, Leviton or Hubbell.

D. Hospital Grade receptacles shall be Leviton 8300 (duplex) and Leviton T7899 (GFCI) as applicable. Approved equals by Hubbell, P&S or Cooper.

E. Controlled Devices shall be permanently marked (imprinted) with the word "controlled" and power symbol to clearly identify which receptacles are turned off when the workspace is vacant per ASHERA 90.1 2013. Leviton CR020 series or equal by Hubbell, P&S or Cooper.

2.04 COVERPLATES

A. Coverplates shall be ??[plastic] midway size thermoplastic nylon Leviton PJ Series ??[steel] satin finish 302 stainless steel standard size (provide jumbo size for concrete and masonry walls) by Leviton or equal by Hubbell, P&S or Cooper.

B. Provide multigang plates for devices shown at the same location. Coordinate gang configuration with the Architect where more than 3 devices are shown at one location.

C. Coverplates for all back-of-house equipment rooms (i.e. mechanical, electrical, loading dock, service corridor, etc.) shall be stainless steel.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide appropriate outlet box for each device or multi-ganged devices.

B. Provide plaster ring reducer for boxes larger than the device plate.

C. Provide dimmer switch type and size to match load.

D. Coordinate locations of all devices with the Architect and the interior detail Drawings.

E. Coordinate cutting; obtain pre-cut openings from manufacturer for door switches, metal partitions and furniture mounted devices.

F. In general, devices in finished spaces shall be flush mounted. Verify the requirements of all spaces with the Architect.

G. Each device shall have a coverplate as is appropriate for the application. Coverplates shall be installed true and plumb with building lines, mortar joints and architectural features.

H. Mount receptacles and special systems outlets vertical and 18" above the finished floor to the device centerline, unless noted or required otherwise.

I. Mount switches vertical and 48" above the finished floor to the device centerline and 6" from a door strike, unless noted or required otherwise.

J. All exterior devices shall be provided with a weatherproof cover/enclosure. Exterior receptacles shall be GFCI type.

K. Coordinate mounting heights for devices indicated to be mounted over counter with the Architect.

L. Provide a green insulated bonding jumper for all grounded devices and bond to the outlet box.

M. Each outlet used as a junction box, or for future device or fixture, shall be fitted with a blank coverplate to match other device coverplates.

N. Floor outlets shall be of the necessary type suitable for the application and installed per the manufacturer's recommendation. Fire ratings shall be maintained. Where the installation of a specified or required floor box affects the elevated slab/floor fire rating, the necessary fire assembly (approved by the Architect) shall be constructed below the slab.

O. Do not locate junction boxes or voice/data conduit stub downs for poke-thru devices above a non-accessible ceiling. In these cases, extend the poke-thru conduit to an accessible ceiling.

END OF SECTION 262700

# SECTION 26 29 00 - MOTOR CONTROLS AND WIRING

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Provide all equipment, materials, tools and labor to provide a complete system for motor operation. Refer to other related Sections of Divisions 21, 22 and 23 and the Mechanical, Electrical and Plumbing Drawings.

B. A Motor starter shall be provided by Division 26 for each motor except for those specified in Divisions 21, 22 or 23 to be furnished by that Division. All motor starters not integral to the equipment served shall be installed and connected by Division 26.

C. All low voltage control wiring shall be provided by Division 21, 22 or 23 unless specifically noted otherwise on the Drawings.

D. Provide 120-volt line voltage for controls as required. Provide 120 volt to all line voltage motor operated dampers. Provide fire alarm connections to all fire and smoke dampers. Coordinate with Divisions 21, 22 and 23.

## PART 2 - PRODUCTS

### 2.01 MOTOR STARTERS

A. All motor starters shall be UL listed.

B. The motor starters shall be front wired with all terminals accessible for wiring directly from the front. All contacts shall be solid silver cadmium oxide alloy. Bare copper or silver-flashed type shall not be permitted. Operating coils shall be pressure molded and so designed that if accidentally connected to excessive voltage they will not expand, bubble, or melt. When a coil fails under over-voltage conditions, the motor controller shall definitely drop out and not freeze the contacts in the "ON" position.

C. All three-phase full voltage magnetic motor starters shall have overload protection in all three phases. All single-phase full voltage magnetic motor controllers shall have overload protection in ungrounded phases. All two-speed full voltage magnetic motor controllers shall have overload protection in all six (6) legs of the controller. Overload relays shall be furnished for each phase and shall be of the hand-reset trip-free variety so that blocking the reset mechanism in the reset position will not prevent the motor controller from dropping out if the motor is overloaded. This specifically excludes those overload relays which change to automatic reset from hand-reset when the reset mechanism is blocked. Accidentally depressing the reset button or mechanism will not shut-off the motor. Overload relays shall NOT be field convertible from hand to automatic reset type.

Overload relays shall be the thermal bi-metallic type. Circuit breaker disconnects for combination motor starters shall be magnetic only.

D. Motor starters shall be provided with auxiliary dry contacts as follows:
   1. NEMA size 3 and larger: two (2) N.O. and two (2) N.C.
   2. NEMA size 2: two (2) N.O. and one (1) N.C.
   3. NEMA size 1 and 0: one (1) N.O. and one (1) N.C.

E. Provide necessary terminal strips and relays as required for interface with the motor operation, the Building Automation System, Fire Alarm System, and Fireman's Override Panel (if applicable). Coordinate with Division 23.

F. In general, motor starter enclosures shall be NEMA Type 1, general purpose unless exposed to the weather or unless otherwise specified on the Drawings. Motor starters exposed to the weather shall be NEMA Type 3R watertight.

G. Generally, holding coils in full voltage magnetic motor starters shall be suitable for use on 120-volt, AC control voltage. Each controller shall have a control power transformer with primary and secondary fuses. Control power transformer shall have at least 50 VA capacity over and above the standard capacity required for holding coil and LED pilot light duty. Sizing of control transformers shall be coordinated with Division 23.

H. Two-speed motor starters for two-speed motors shall have "decelerating relay" between high and low speed.

I. Each motor starter shall be equipped with a handoff-automatic or start-stop push-button, as required by Division 15. Provide green LED light for "RUNNING", red LED light for "STOPPED". Provide amber LED light reading "TRIPPED" and interfaced with overload relay alarm contacts. Two-speed motor starters shall have "fast-slow" LED lights as well as a fast-slow selector switch in conjunction with the HOA as required by Division 23. LED lights will be operated by an interlock in the motor starters not placed across the operating coil. In addition to the holding interlock and LED light interlocks, each starter shall have four extra interlock contacts – two normally open and two normally closed.

J. Where indicated on the Drawings at individual motor starters, provide surge protection on the load side of the motor controller. Surge protection shall consist of one protective capacitor and one secondary arrestor.

K. Acceptable manufacturers are ABB-GE, Square 'D', Cutler-Hammer, Siemens, Allen-Bradley.

2.02 MOTOR CONTROL CENTERS

A. A combination starter shall be provided in the motor control center for each motor and shall be plug-in circuit breaker with voidable cover interlock. Provide provision for padlocking the cover and operating handle. Provide interrupting capacity as required, minimum 65KA RMS SYM.

B. Motor starters shall be mounted in individual compartment below the breaker associated with it.

C. Provide a mechanical interlock to prevent opening the starter compartment door unless it is in the "off" position.

D. Provide an individual control circuit transformer in each section of the motor control center with fused secondary.

E. Provide a control terminal strip in the Motor Control Center. The control wiring from these terminal strips, external to the Motor Control Center, to the respective control device, shall be included in Division 21, 22 or 23.

F. Acceptable manufacturers are ABB-GE, Square 'D', Cutler-Hammer, and Siemens. All circuit breakers, motor starters, push buttons and pilot lights shall be of the same manufacturer as the electrical distribution equipment (switchboards, panelboards, etc.).

PART 3 - EXECUTION

3.01 INSTALLATION

A. All motor starters shall be installed by Division 26 unless an integral part of a piece of equipment.

B. Provide all power wiring to motors unless pre-wired as part of a packaged unit.

C. Provide line voltage power wiring through a control device (i.e. fire stats, thermostat, aqua stat, smoke dampers) where required. Provide duct smoke detectors or in-duct smoke detectors at all smoke dampers. Coordinate with Divisions 21, 22 and 23.

D. Where multiple mechanical terminal units (e.g. PIU's) containing multi-phase heating elements and single-phase motors are connected together on the same multi-phase homerun/circuit, the single-phase motors shall be connected to alternate phases to balance the load. Coordinate with Division 23. Provide a neutral conductor of equal size to the phase conductors unless noted otherwise on the Drawings.

E. Where multiple mechanical terminal units (e.g. PIU's) containing multi-phase heating elements and single-phase motors are connected together on the same multi-phase homerun/circuit, each unit shall require power side fusing. Electrical Contractor shall provide fused disconnect if unit is not provided with unit power side fusing. Coordinate with Division 23.

F. Motor controllers or industrial control panels of multi-motor and combination load equipment shall be marked with a short circuit current rating. The available short circuit current and the date the short circuit current calculation was performed shall be documented and made available to those authorized to inspect the installation. Electrical Contractor shall provide disconnect with current limiting

fuses where the available short-circuit current exceeds it short-circuit current rating. Coordinate with Division 23.

END OF SECTION

SECTION 264304 - SURGE PROTECTIVE DEVICE

PART 1 – GENERAL

1.01 DESCRIPTION

A. The Surge Protection Device (SPD) covered under this section includes all service entrance type surge protection devices suitable for use as Type 1 or Type 2 devices per UL1449 3rd Edition, applied to the line or load side of the utility feed inside the facility.

B. An SPD located at Service Entrance (see plans for additional SPD devices).

C. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to finish and install surge protection devices.

1.02 QUALITY ASSURANCE

A. Reference Standard: Comply with the latest edition of the applicable provisions and recommendations of the following, except as otherwise stated in this document:
1. UL 1449 4th Edition with latest revisions.
2. UL 1283.
3. ANSI/IEEE C62.41, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
4. ANSI/IEEE C62.45, Guide for Surge Testing for equipment connected to Low-Voltage AC Power Circuits.
5. UL96A
6. IEEE 1100 Emerald Book.
7. National Fire Protection Association (NFPA 70: National Electrical Code).

1.03 SUBMITALLS/QUALITY ASSURANCE – SUBMIT THE FOLLOWING:

A. Package must include show drawings complete with all technical information, unit dimensions, detailed installation instructions, maintenance manual, recommended replacement parts list and wiring configuration.

B. Copies of Manufacturer's catalog data, technical information and specifications on equipment proposed for use.

C. Copies of documentation stating that the Surge Protection Device is listed by UL to UL1449 3rd Edition, category code VZCA.

D. Copies of actual let through voltage data in the form of oscillograph results for both ANSI/IEEE C62.41 Category C3 (combination wave) and B3 (Ring wave) tested in accordance with ANSI/IEEE C6245.

E. Copies of Noise Rejection testing as outlined in NEMA LS1-1992 (R2000) Section 3.11. Noise rejection is to be measured between 50kHZ and 100MHz verifying the devices noise attenuation. Must show multiple attenuation levels over a range of frequencies.

F. Copies of test reports from a recognized independent testing laboratory, capable of producing 200kA surge current waveforms, verifying the suppressor components can survive published surge current rating on a per mode basis using the ANSI/IEEE C62.41 impulse waveform C3 (8 x 20 microsecond, 20kV/10kA). Test data on an individual module is not acceptable.

G. Copy of warranty statement clearly establishing the terms and conditions to the building/facility owner/operator.

PART 2 – PRODUCTS

2.01 APPROVED MANUFACTURER:

A. Current Technology – Transguard3 or TG3 Series 200kA per mode surge rating or approved equal by Liebert, ABB-GE.

2.02 MANUFACTURED UNITS/ELECTRICAL REQUIREMENTS

A. Refer to drawing for operating voltage, configuration and surge current capacity per mode for each location, or you may list locations and information here.

B. Declared Maximum Continuous Operating Voltage (MCOV) shall be greater than 115 percent of the nominal system operating voltage and in compliance with test and evaluation procedures outlined in the nominal discharge surge current test of UL1449 3rd Edition, section 37.7.3. MCOV values claimed based on the component's value or on the 30-minute 115% operational voltage test, section 38 in UL1449 will not be accepted.

C. Unit shall have no more than 10% deterioration or degradation of the UL1449 3rd Edition Voltage Protection Rating (VPR) when exposed to a minimum of 5,000 repeated category C3 (20kV/10kA) surges. The SPD manufacturer must provide a test report validating the repetitive surge test was performed.

D. Protection Modes UL1449 3rd Edition VPR (6kV, 3kA) for grounded WYE/delta and High Leg Delta circuits with voltages per the contract documents shall be as follows and comply with test procedures outlined in UL1449 3rd Edition section 37.6:

| System Voltage | Mode | MCOV | B3 Ringwave 6kV, 500A | C3 Comb. Wave 20kV, 10kA | UL 1449 Third Edition VPR Rating |
|---|---|---|---|---|---|
| 120/240, 120/208 | L-N | 150 | 490 | 980 | 700 |
| | L-G | 150 | 570 | 980 | 700 |
| | N-G | 150 | 640 | 1170 | 700 |
| | L-L | 300 | 500 | 1600 | 1200 |
| 277/480 | L-N | 320 | 450 | 1420 | 1200 |
| | L-G | 320 | 540 | 1540 | 1200 |
| | N-G | 320 | 570 | 1600 | 1000 |
| | L-L | 552 | 530 | 2600 | 2000 |

E. Electrical Noise Filter - each unit shall include a high-performance EMI/RFI noise rejection filter with a maximum attenuation of 54dB per MIL-STD-220B.
   1. SPD shall include an EMI/RFI noise rejection filter for all L-N modes as well as a removable filter in the N-G mode.

F. Integral Disconnect Switch
   1. The device shall have an optional NEMA compliant safety interlocked integral disconnect switch with an externally mounted metal manual operator.
   2. The switch shall disconnect all underground circuit conductors from the distribution system to enable testing and maintenance without interruption to the facility's distribution system.
   3. The switch shall be rated for 600Vac.
   4. The SPD device shall be tested to UL1449 3rd Edition listed with the integral disconnect switch and the UL1449 VPR ratings shall be provided.
   5. The integral disconnect switch shall be capable of withstanding, without failure, the published maximum surge current magnitude without failure or damage to the switch.
   6. The line side of the integral disconnect shall be blocked off so that when the SPD is opened there is no direct access to the voltage present on the line side of the disconnect.

G. The UL1449 Voltage Protective Rating (VPR) shall be permanently affixed to the SPD unit.

H. The UL1449 Nominal Discharge Surge Current Rating shall be 20kA.

I. The SCCR rating of the SPD shall be 200kAIC without the need for upstream over current protection.

J. The SPD shall be listed as Type 1 SPD, suitable for use in Type 1 or Type 2 applications.

K. The SPD shall have the following monitoring options.
   1. Time Date stamp, duration and magnitude for the following power quality events (sags, swells, surges, dropouts, outages, THD, frequency, Volts RMS per phase)
   2. SPD monitoring shall track surge protection and display it as a percentage.
   3. SPD shall provide a surge counter with three categories to be defined as Low Level surge (100A-500A) Medium Level surge (500A-3,000A) High Level surge (>3,000A)
   4. Remote communications via ModBus or Ethernet

PART 3 –EXECUTION/INSTALLATION

3.01 The SPD manufacturer's technician shall perform a system checkout and start-up in the field to assure proper installation, operation and to initiate the warranty of the system. The technician will be required to do the following:

A. Verify voltage clamping levels utilizing a diagnostic test kit, comparing factory readings to installed readings.

B. Verify N-G connection.

C. Record information to a product signature card for each product installed.

3.02 Unit may be installed on either the line or load side of the main service disconnect. If installed on the line side unit shall be installed with an integral disconnect. If installed on the load side the unit shall be installed on the largest breaker size available. If installed lead length exceeds 5' installer shall use a low impedance (HPI) cable to reduce the lead lengths effect on the installed performance of the SPD.

PART 4 –PRODUCT WARRANTY

4.01 Warranty on defective material and workmanship shall be for 15 years.

4.02 Copy of Warranty to be sent with submittal.

END OF SECTION 264304

# SECTION 265000 - LIGHTING

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Provide lighting fixtures complete with all lamps as specified on the Electrical, Architectural, Interior and Lighting Designer Drawings. Provide all supports, brackets, connectors, materials, tools, wiring, controls and labor to provide a complete and operating lighting system.

B. All blemished, damaged or unsatisfactory fixtures shall be replaced in a satisfactory manner as directed by the Architect.

C. Where a fixture type designated has been omitted, cannot be determined or is in conflict with other Drawings or Specifications, request a clarification from the Architect, prior to bid, and provide suitable fixture type as directed.

D. All lamps shall be operating at project completion and for a period of six (6) months after the final acceptance by the Owner.

E. Confirm exact locations of lighting fixtures with the Architectural Reflected Ceiling Plan and mechanical equipment above or on the ceiling.

F. All recessed lighting fixtures shall match the ceiling type and be tested and certified by the fixture manufacturer for the type of mounting.

### 1.02 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Handle lighting fixtures carefully to prevent breakage, denting and scoring the fixture finish. Do not install damaged lighting fixtures; replace and return damaged units to equipment Manufacturer.

B. Store lighting fixtures in clean, dry space. Store in original cartons and protect from dirt, physical damage, weather, and construction traffic.

### 1.03 SUBMITTALS

A. The following submittal data shall be furnished according to Section 01 33 00 and Section 26 01 00 and shall include but not be limited to:
   1. Lighting fixtures complete with physical dimensions, materials, connector details, voltage, current, installation details, air handling capability, etc.
   2. Lamps complete with base or pin configuration, lumen rating, life expectancy, color temperature, starting characteristics, etc.

## PART 2 - PRODUCTS

### 2.01 LIGHTING FIXTURES

A. Base bid lighting fixtures shall be based on manufacturer and descriptions listed. Alternate fixture manufacturers not specified and proposed by the Contractor shall be submitted for approval prior to base bid.

B. Fixtures are designated on the Drawings by "type" as indicated by a letter that corresponds to a lighting fixture description and specification on the lighting fixture schedule.

C. Each lighting fixture shall comply with NEC Article 410, Energy Independence & Security Act, local codes and the authority having jurisdiction.

D. Provide a lighting fixture complete with lamps, ballasts and required accessories for each lighting fixture shown. Provide all mounting and trim hardware to suit the specific installation and location.

E. All lighting fixtures shall bear a U.L. label.

F. Where fixtures are specified with acrylic lens, provide virgin acrylic with 0.125-inch thickness.

G. Exit lighting fixtures shall meet the requirements of all federal, state and local codes.

2.02 LAMPS

A. Incandescent A-lamps shall be inside frosted, and 130 volts rated unless noted otherwise. Par and reflector type lamps shall be 130 volts rated.

B. All lamps shall be as specified on the Lighting Fixture Schedule.

C. Fluorescent lamps in general shall be T8, 48-inch length with initial lumens of 2,950 at 32 watts and an average life of 20,000 hours. If a color is not designated on the Drawings, then provide 3500K color lamps. Ballast and lamps shall be compatible.

D. Acceptable manufacturers are General Electric, Osram-Sylvania or Philips.

2.03 LAMP HOLDERS

A. For incandescent, provide porcelain body and nickel-plated brass socket, prelubricated with silicone compound.

B. For fluorescent, provide white urea plastic body and silver-plated phosphor bronze or beryllium copper contacts. Fluorescent lamp sockets with open-circuit voltage over 300 volts shall be safety type and designed to open circuit when lamp is removed.

C. For compact fluorescent lamps, provide molded thermoplastic body with copper alloy contacts and stainless-steel retainer clips. Provide pin configuration to match lamps.

D. For high intensity discharge, provide porcelain body and nickel-plated brass socket, prelubricated with silicone compound. Medium base sockets shall be 4 KV pulse rated.

2.04 BALLASTS

A. General
1. All ballasts shall be UL listed and CBM certified. Ballasts shall be CSA certified where applicable.
2. Ballast shall be approved for operating with specified lamp. Ballast shall provide normal rated lamp life as stated by acceptable lamp manufacturer.
3. Ballast shall be suitable to operate on the voltage system they are connected to and maintain correct lamp operation with 10% fluctuation of rated input voltage with no damage to ballasts or lamps.
4. Ballast shall have the lowest sound rating available for the lamps specified. Replace noisy ballasts as directed by Engineer at no cost to the Owner.
5. Ballast shall contain no PCBs.
6. Ballasts shall be identical within each fixture type. All ballasts within the same luminaire shall be from the same manufacturer.
7. Ballast shall support a sustained short to ground on open circuit of any output leads without damage to the ballast and without blowing fuses either inside the ballast or in line with the ballast.
8. Ballast shall be suitable to operate in:
   a. Indoor heated or air-conditioned spaces: 50°F to 150°F ambient.
   b. Outdoor or in unheated spaces: 0°F to 105°F.
   c. Un-air-conditioned spaces: 50°F to 150°F at rated life in pendant mounted industrial type fixture.
   d. Recess mounted fixtures: in maximum 140°F ceiling cavity.
   e. With fire-rated covering, clear air space between fixture and covering minimum of 3 inches.
9. Provide ignitor shut-off device for CSA, HX and R ballast similar to Advance LISOD1 series. The device shall disable the ignitor after 15 minutes of pulsing in cases when lamp has failed or has been removed from socket.
10. Ballast for T-4 and T-5 lamps shall have lamp fault interrupter for end of life failure.
11. Manufacturer shall have been manufacturing ballasts for at least 5 years.

B. Fluorescent Ballast
1. Ballast shall be high frequency and operate lamps at a frequency above 25 KHz with less than 2% lamp flicker.
2. Provide rapid start 0.99 power factor ballast, except as noted, with required voltage and frequency.
3. Ballast shall be UL listed Class P with integral resetting thermal protector and be suitable for use indoor or Type 1 outdoor application.
4. Ballast case temperature shall not exceed 90°C.
5. Ballast shall have a ballast factor of greater than .875.
6. Ballast shall comply with Federal Communications Commission Part 18C limits for electromagnetic interference and radio frequency interference for non-consumer equipment.

7. Ballast shall provide transient immunity as specified by ANSI C62.41, Category A (formerly IEEE 587, Section B).
8. Ballast shall have lamp current crest factor of less than 1.7.
9. Total harmonics distortion shall be less than 10%.
10. Third harmonic distortion shall be less than 6%.
11. Ballast shall internally limit in-rush current to not exceed 30 times normal operating current for duration of 5 milliseconds.
12. Manufacturer shall provide 5-year written warranty against defects in material or workmanship, including replacement labor cost.
13. Acceptable manufacturers are Magnetek, Motorola, Osram/Sylvania and Advance.

C. T-8 Electronic Fluorescent Dimming Ballast
1. Ballast shall meet criteria for electronic fluorescent ballasts. See above.
2. Smooth continuous dimming ranges from 100%-1%.
3. Power factor greater than .90.
4. Total harmonic distortion less than 20%.
5. No visible lamp flicker over entire dimming range.
6. Ballast shall be capable of striking lamps at any light level without first flashing to 100% output.
7. Ballast shall be UL listed for operating specified lamps.
8. Ballast shall be inaudible over entire dimming range.
9. Acceptable manufacturer is Lutron.

D. T-4 and T-5 Compact Fluorescent Electronic Dimming Ballast
1. Ballast shall meet criteria for electronic fluorescent ballasts. See above.
2. Smooth continuous dimming ranges from 100%-5%.
3. Power factor greater than .90.
4. Total harmonic distortion less than 20%.
5. No visible lamp flicker over entire dimming range.
6. Ballast shall be capable of striking lamps at any light level without first flashing to 100% light output.
7. Ballast shall be UL listed for operating specified lamps.
8. Ballast shall be inaudible over entire dimming range.
9. Acceptable manufacturer is Lutron.

E. High Intensity Discharge
1. Provide constant wattage autotransformer (CWA) or high reactance autotransformer high power factor (HX-HPF) type ballast with power factor greater than .90 except as noted.
2. Ballast shall be designed with Class N insulation.
3. Drop out voltage shall be not less than 70% of nominal.
4. For indoor commercial application:
    a. Provide NEMA rated AA@ sound rating.
    b. Ballast shall comply with Federal Communications Commission Part 18C limits for electromagnetic interference and radio frequency interference.
    c. Ballast shall provide immunity as specified by ANSI C82-4.
5. Acceptable manufacturers are Magnetek, Osram/Sylvania, Advance, and Valmont.

F. Drivers for LED Fixtures

1. Electronic Driver for LED Fixtures: Comply with UL 1310 Class 2 requirements for dry and damp locations. Include the following features unless otherwise indicated:
   a. Rated for 50,000 hours of life, unless otherwise noted.
   b. Sound Rating: Class A.
   c. Total Harmonic Distortion Rating: 15 percent or less.
   d. Current Crest Factor: 1.5 or less.
   e. 0-10V Dimming Standard (Step Dimming does not qualify)

2.05 EMERGENCY BATTERY LIGHTING

A. Lighting fixtures indicated on the drawings to be provided with an emergency battery ballast shall provide emergency lighting by using standard fluorescent lamp or lamps and an emergency battery ballast. The ballast shall consist of a field replaceable high temperature, maintenance free nickel cadmium battery, charger and electronic circuitry contained in one metal case. Provide a solid state charging indicator light to monitor the charger and battery, double pole test switch and installation hardware. The battery ballast shall provide power to the fluorescent lamp upon failure of the normal supply to the fixture.

B. The test button and indicator light shall be integral in the fixture reflector and shall be positioned within or on the surface of the fixture so as to be accessible and identifiable.

C. Under normal mode the battery ballast shall keep the batteries at full charge. Upon loss of normal power, the battery ballast shall operate the fluorescent lamp or lamps for 90 minutes.

D. Battery recharge time shall not exceed 16 hours to fully recharge and shall not exceed 225 milliamperes charging current.

E. The lumen output of the lamp or lamps powered by battery unit shall be not less than 1100 lumens initially for a four-foot fluorescent lamp.

F. The battery ballast shall meet or exceed all the requirements set forth in UL924 "Emergency Lighting and Power Equipment" and shall be UL listed for installation on top of or remote from the fixture. Emergency illumination shall meet or exceed the requirements set forth in the National Electric Code, Life Safety Code and UL 90-Minute Requirements.

2.06 LED FIXTURES

A. Except as otherwise indicated, provide LED luminaires, of types and sizes indicated on fixture schedules.

B. Include the following features unless otherwise indicated:
   1. Each Luminaire shall consist of an assembly that utilizes LEDs as the light source. In addition, a complete luminaire shall consist of a housing, LED array, and electronic driver (power supply).
   2. Each luminaire shall be rated for a minimum operational life of 50,000 hours utilizing a minimum ambient temperature of (25°C).

3. Light Emitting Diodes tested under LM-80 Standards for a minimum of 12,000 hours.
4. Color Rendering Index (CRI) of 82 at a minimum.
5. Color temperature shall be as indicated in the schedule.
6. Rated lumen maintenance at 70% lumen output for 50,000 hours, unless otherwise indicated.
7. Fixture efficacy of 100 Lumens/Watt, minimum.
8. 5-year luminaire warranty, minimum.
9. Photometry must comply with IESNA LM-79.
10. The individual LEDs shall be constructed such that a catastrophic loss of the failure of one LED will not result in the loss of the entire luminaire.
11. Luminaire shall be constructed such that LED modules may be replaced or repaired without the replacement of the whole fixture.

Technical Requirements

1. Luminaire shall have a minimum efficacy of 60 lumens per watt. The luminaire shall not consume power in the off state.
2. Operation Voltage: The luminaire shall operate from a 50 HZ to 60 HZ AC line over a voltage ranging from 120 VAC to 277 VAC. The fluctuations of line voltage shall have no visible effect on the luminous output.
3. Power Factor: The luminaire shall have a power factor of 0.9 or greater.
4. THD: Total harmonic distortion (current and voltage) induced into an AC power line by a luminaire shall not exceed 15 percent.
5. Operational Performance: The LED circuitry shall prevent visible flicker to the unaided eye over the voltage range specified above.

C. Thermal Management

1. The thermal management (of the heat generated by the LEDs) shall be of sufficient capacity to assure proper operation of the luminaire over the expected useful life.
2. The LED manufacturer's maximum thermal pad temperature for the expected life shall not be exceeded.
3. Thermal management shall be passive by design. The use of fans or other mechanical devices shall not be allowed.
4. The luminaire shall have a minimum heat sink surface such that LED manufacturer's maximum junction temperature is not exceeded at maximum rated ambient temperature.

## PART 3 - EXECUTION

### 3.01 GENERAL

A. Locations on the Drawings are diagrammatic. Verify exact locations with Architectural Reflected Ceiling Plans and coordinate space conditions with other trades.

B. Modify locations in mechanical equipment rooms to suit the conditions of the mechanical equipment while maintaining a sufficient and uniform lighting level equal to that provided by the layout shown on the Drawings.

C. Fixtures of the same type and in the same ceiling shall have lamps, socket assembling, and door hinges oriented in the same direction.

D. Reflector cones, baffles, aperture plates, light controlling element for air handling fixtures and decorative elements shall be installed after completion of ceiling tiles, painting and general cleanup.

E. Target and focus adjustable lighting fixtures after regular working hours and before building acceptance. Permanently indicate targeting on fixture and provide positive locking devices to preclude mis-focus relamping. Target and focus in the presence of the Architect and Lighting Designer.

F. Relamp all incandescent and low-voltage fixtures immediately prior to Owner's acceptance of building. Replace non-operating, damaged or darkened fluorescent and high intensity discharge lamps immediately to Owner's acceptance of building.

G. Clean all fixture reflectors, lenses, louver, decorative accessories and lamps immediately prior to Owner's acceptance of building. Destaticize plastic lenses and diffusers after cleaning.

H. Lighting fixtures mounted within, under, on or integral with millwork shall be given special consideration. Fixture counting and sizes shall be coordinated with the applicable space and adjusted accordingly. This coordination shall occur prior to ordering fixtures. Refer to Architectural Drawings for details.

3.02 SUPPORT OF LIGHT FIXTURES

A. Support directly from building structure, any lighting fixture which weighs in excess of the capacity of the suspended ceiling on which it is installed. Support each such fixture with the quantity of threaded rods or fixture support wires required to prevent fixture warping; however, provide no less than two rods or wire per fixture.

B. Outlets, which are recessed in a suspended ceiling and support the weight of surface-mounted or suspended fixtures, shall be supported from a channel spanning and secured to the ceiling support system. Support each end of the channel with a fixture support wire attached to structure.

C. Installation in grid-type suspended ceiling:
   1. Support each corner of a grid opening, in which a lay-in fixture is located, with a fixture support wire attached to structure. Provide a support clip, securely fastened to the ceiling grid, at or near each corner of each lay-in fixture.
   2. Support fixtures, which are smaller than the ceiling grid opening, and which are recessed in the acoustical panel, with at least two metal channels spanning, and secured to, the ceiling grid. Support each end of each channel or each corner of the grid opening with a fixture support wire attached to structure. Do not support fixtures by ceiling acoustical panels.

D. Provide additional supports as required by local codes and seismic zone.

END OF SECTION 265000

# SECTION 270000 - COMMUNICATIONS

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Applicable requirements of General Requirements/Provisions shall be considered a part of this section and shall have the same force as if printed herein full. In addition, all information related to communications infrastructure that is documented in the architectural, structural, mechanical, and electrical drawings/documents shall be included as part of the Communications documents.

### 1.02 QUALITY ASSURANCE

A. Specifications, Standards and Codes: All work shall be in accordance with the following:

1. 2020 National Electrical Code (NFPA 70) with Georgia Amendments.
2. 2018 Life Safety Code (NFPA 101) with Georgia Amendments.
3. 2018 International Building Code with Georgia Amendments.
4. TIA-568.0-X - Generic Telecommunications Cabling for Customer Premises.
5. TIA-568.1-X - Commercial Building Telecommunications Infrastructure Standard.
6. TIA-568-C.X – Twisted-Pair Copper Cabling and Components Standard.
7. TIA-568.3-X – Optical Fiber Cabling and Components.
8. TIA-568-C.X – Broadband Coaxial Cabling and Components.
9. TIA-569 - Telecommunications Pathway and Spaces.
10. TIA-570 - Residential Telecommunications Infrastructure Standard.
11. TIA-598 - Fiber Optic Color Codes.
12. TIA-607-X - Generic Telecommunications; Bonding and Grounding (Earthing) for Customer Premises.
13. TIA-758 - Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
14. TIA-526-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant.
15. TIA-526-14 - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant.
16. BICSI Telecommunications Distribution Methods Manual (Latest Edition including all addendums).
17. IEEE 1100 – Recommended Practice for Powering and Grounding Electronic Equipment (The Emerald Book).
18. 
19. American National Standards Institute (ANSI)
20. NEMA WC 26 - Wire and Cable Packaging (Current Version adopted by the State, per NFPA website).
21. Electronic Industries Association (EIA)
22. Underwriters Laboratories (UL)
23. American Standards Association (ASA)
24. Federal Communications Commission (FCC)
25. Occupational Safety and Health Administration (OSHA)
26. American Society of Testing Material (ASTM)

27. Americans with Disabilities Act (ADA)
28. Local city and county ordinances governing electrical work
29. In the event of conflicts, the more stringent provisions shall apply.

1.03 SCOPE

A. The work to be done under this section of the Specifications shall include furnishing labor, material, equipment and tools required for the complete installation of the work indicated on the Drawings or as specified herein.

B. All materials, obviously a part of the Communications Infrastructure and necessary to its proper operation, but not specifically mentioned or shown on the Drawings, shall be furnished and installed without additional charge.

C. The Drawings and Specifications are complementary to each other and what is called for by one shall be as binding as if called for by both. If a discrepancy exists between the Drawing and Specifications, the higher cost shall be included, and the Design Professional shall be notified of the discrepancy.

1.04 WORK INCLUDED

The Communications Infrastructure installed and work performed under this Division of the Specifications shall include but not necessarily be limited to the following:

A. Voice/Data Cabling Infrastructure

B. CATV Cabling Infrastructure System (where indicated in drawings and specifications)

C. Communications conduits, raceways, cable tray, racks, cabinets and equipment mounting boards (where indicated in drawings and specifications)

D. Grounding and Bonding

E. Concrete work for wall and floor penetrations (where indicated in drawings and specifications)

1.05 DEFINITIONS

A. Terms: The following definitions of terms supplement those of the General Requirements and are applicable to Division 27 - Communications:

B. Provide: As used herein shall mean "furnish, install and test (if applicable) complete."

C. Infrastructure: As used herein shall mean cable, conduit, raceway, cable tray or j-hooks with all required boxes, fittings, connectors, and accessories; completely installed.

D. Work: As used herein shall be understood to mean the materials completely installed, including the labor involved.

1.06 DRAWINGS

A. Drawings are generally diagrammatic and show the arrangement and location of pathways, outlets, support structures and equipment. The Construction Professional shall carefully investigate the structural and finish conditions affecting his work and arrange his work accordingly. Should conditions on the job make it necessary to adjust pathways or materials, the Construction Professional shall so advise the Design Professional and secure approval before proceeding with such work.

B. Where exact locations are required by equipment for stubbing-up and terminating conduit concealed in floor slabs, the Construction Professional shall request shop drawings, equipment location drawings, foundation drawings, and any other data required by him to locate the concealed conduit before the floor slab is poured.

C. Materials, equipment, or labor not indicated but which can be reasonably inferred to be necessary for a complete installation shall be provided. Drawings and Specifications do not undertake to indicate every item of material, equipment, or labor required to produce a complete and properly operating installation.

D. The right is reserved to make reasonable changes in locations of equipment indicated on Drawings prior to rough-in without increase in contract cost.

E. The Construction Professional shall not reduce the size or number of conduit runs indicated on the Drawings without the written approval of the Design Professional.

F. Any work installed contrary to Contract Drawings shall be subject to change as directed by the Design Professional, and no extra compensation will be allowed for making these changes.

G. The location of equipment, support structures, outlets, and similar devices shown on the Drawings are approximate only. Do not scale Drawings. Obtain layout dimensions for equipment from Architectural plans unless indicated on Communications plans.

H. Schematic diagrams shown on the Drawings indicate the required functions only. The technology of a particular manufacturer may be used to accomplish the functions indicated without exact adherence to the schematic Drawings shown. Additional labor and materials required for such deviations shall be furnished at the Construction Professional's expense.

I. Verify the ceiling type, ceiling suspension systems, and clearance above hung ceilings prior to ordering cabling and associated hardware. Notify the Design Professional of any discrepancies.

J. Review all architectural drawings for modular furniture.

K. Portions of these Drawings and Specifications are abbreviated and may include incomplete sentences. Omissions of words or phrases such as “the Construction

Professional shall," "shall be," "as indicated on the Drawings," "In accordance with," "a," "the" and "all are intended" shall be supplied by inference.

1.07 SUBMITTALS

A. Submit for approval, details of all materials, equipment, and systems to be furnished. Work shall not proceed without the Owner and/or the Project Manager's approval of the submitted items. Three (3) copies of the following shall be submitted:

1. Submittals for individual systems and equipment assemblies that consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered, reviewed, or stored, and such submittals will not be returned except at the request and expense of the Construction Professional.

2. Construction Professional shall generate shop drawings. Shop drawings shall include equipment racks, patch panels, termination blocks, connection details, rack mounting details, workstation/ patch panel labeling scheme, and any other details not included in the construction drawings.

3. Shop drawings shall be generated using AutoCAD or Revit software and shall include Construction Professional's title block. Shop drawings shall provide all necessary information for the installation of the system by Construction Professional's personnel and for future maintenance and modification of the system as required.

B. Any materials and equipment listed that are not in accordance with Specification requirements may be rejected.

C. The Construction Professional shall obtain complete shop drawings, product data and samples from the manufacturers, suppliers and vendors, for all materials and equipment as specified herein in various Sections of the Specifications, and shall submit data and details of such materials and equipment for review by the Design Professional. Prior to submission of the shop drawings, product data and samples to the Design Professional, the Construction Professional shall thoroughly review the shop drawings, product data and samples and certify they are in compliance with the Contract Drawings. Further, the Construction Professional shall check all materials and equipment upon their arrival on the Project site and verify their condition and compliance with the Contract Documents. Any Work which proceeds prior to receiving reviewed shop drawings shall be modified as required to comply with the Contract Documents and the shop drawings. A minimum period of ten (10) working days, exclusive of transmittal time, will be required in the Design Professional's office each time a shop drawing, product data and/or sample is submitted or resubmitted for review. This time period shall be considered by the Construction Professional when scheduling his Work. The initial shop drawing review for equipment and materials may be expedited through the mutual consent of the Construction Professional, Design Professional and Owner providing the Construction Professional agrees to submit complete, certified, documented, and coordinated shop drawings for review in accordance with the requirements of the Contract Documents.

D. The review of shop drawings, product data, and samples by the Design Professional shall not relieve the Construction Professional of the responsibility for dimensions or errors that may be contained therein, or for deviations from requirements in the Contract Documents. Is shall be clearly understood that the noting of some errors by the Design Professional but overlooking others does not grant the Construction Professional permission to proceed in error.

E. All shop drawings and product data/submittals shall be submitted in compliance with the requirements of the general and supplementary conditions. No more than four (4) copies of submittal data will be reviewed. Any additional copies will be returned unmarked. The responsibility of copying review comments on any additional copies will rest solely with the Construction Professional.

F. All product data/submittals shall bear the name of the manufacturer to be used.

G. All shop drawings and submittals shall include a stamped indication signifying that the submittal has been reviewed for compliance with the Contract Documents by the Construction Professional. This stamped indication also represents the fact that the Construction Professional has checked this submittal for its interaction with all other Divisions and certifies by his signature or initials that all coordination has taken place. The stamp shall include the date, name of the Contracting Firm, the signature of the Construction Professional, certification of compliance and approval. This stamp shall be on the submittal before the Design Professional will review it.

H. The Design Professional will review an individual submittal not more than twice. If the submittal is rejected again on the second review, the Construction Professional will bare all responsibility for paying for the Design Professional's time for additional reviews.

1.08 RECORD (AS-BUILT) DRAWINGS AND MAINTENCE MANUALS

A. The Construction Professional shall maintain on a daily basis at the Project site a complete set of "Record Drawings". The "Record Drawings" shall consist of a set of prints or AutoCAD files of the Construction Professional Coordination Drawings for this Division. The prints shall be marked or the AutoCAD file electronically updated to show the precise location of all buried or concealed work and equipment, including embedded conduit and junction boxes, and all changes and deviations in the Electrical work from that shown on the Contract Documents. This requirement shall not be construed as authorization for the Construction Professional to make changes in the layout or work without definite instructions from the Design Professional. Prior to commencing work, the Construction Professional shall obtain from the Design Professional a set of AutoCAD Release 2013 or compatible format Design Professional's Drawings on CD, to be used only to produce the Construction Professional's Coordination Drawings. The continuously update coordination drawings shall be used to produce the final "Record Drawings" which shall be delivered to the Owner in AutoCAD electronic format upon Project completion. The Construction Professional shall give to the Design Professional a written release acceptable to the Design Professional signed by a corporate officer of the Construction Professional prior to receipt of the Design Professional's Drawings.

B. Also provide the following documents for record to the tenant / owner at the conclusion of the project.

C. Test results with a clear indication of project. Also provide all test results in CSV format. Test results shall include testing of all system horizontal and all system backbone cabling.

D. Drawings with data equipment rack elevations

E. Floor plan with layouts indicating outlet locations and outlet labels.

F. A complete voice and data cabling system layout. This should include but not limited to cable routing, telecom closet(s), telecom outlet / connector label, locations of equipment and termination points.

G. Copy of the manufacturer's technical documentation on all devices used within the cabling system.

H. The design and engineering performed for the cabling system shall be approved by an accredited "Registered Communications Distribution Designer" (RCDD) as defined by Building Industry Consulting Service International (BICSI).

1.09 QUALITY ASSURANCE

A. Equipment and materials required for installation under these Specifications shall be the current model and new (less than one [1] year from the date of manufacture), unused and without blemish or defect.

B. Equipment shall bear labels attesting to Underwriters Laboratories, where subject to label service. Manufacturers of equipment and materials pertinent to these items shall have been engaged in the manufacture of said equipment a minimum of three (3) years and, if so directed by the Owner, be able to furnish proof of their ability by submitting affidavits and descriptive data about their product including size and magnitude comparable to requirements specified herein.

1.10 CONSTRUCTION PROFESSIONAL QUALIFICATIONS

A. The Construction Professional shall have total responsibility for the coordination and installation of the work shown and described in the Drawings and Specifications. The Construction Professional shall be a company specializing in the design, fabrication and installation of integrated communications systems.

B. Communications Systems specified shall be installed under the direction of a qualified Construction Professional. Qualification requirements shall include submittal by the Construction Professional to the Design Professional of the following:

1. List of previous projects of this scope, size, and nature; including names and sizes of projects, description of work, time of completion and names of contact persons for reference.

2. Shall certify that they are manufacturer-authorized for work to be performed.

C. Installer: Minimum of one BICSI certified Technician on the job site at all times with documented formal training in the installation of Category 6, Category 6A and fiber optic cabling systems. 50% of onsite installers shall possess a certification for a total systems solution being installed from the manufacturer of the cabling and terminating hardware. The contractor must present these certifications to the EOR before beginning work.

D. Installer Company: Full time BICSI RCDD with current credentialing on staff. Company specializing in the installation of Category 6, Category 6A, and single-mode fiber optic Structured Cabling Systems with a minimum of 5 years documented experience. Installation certification – 50% of Low voltage installers must be trained by the manufacturer and currently certified to install manufactures product line of copper/fiber wiring. Provide current installer certifications before doing any copper or fiber installations. This certification is part of the warranty.

1.11 COORDINATION WITH OTHER TRADES

A. The Construction Professional shall coordinate communications work with that of other sections as required in order to ensure that the entire communications work will be carried out in an orderly, complete and coordinated fashion.

1.12 SITE INVESTIGATION

A. Prior to submitting bids of the project, visit the site of the work to become aware of existing conditions that may affect the cost of the project. Where work under this project requires extension, relocation, reconnections or modifications to existing equipment or systems, the existing equipment, or systems, shall be restored to their original condition before the completion of this project.

1.13 PERMITS

A. Obtain all permits and inspections for the installation of this work and pay all charges incident thereto. Deliver to the Owner all certificates of said inspection issued by authorities having jurisdiction.

1.14 RENOVATIONS AND ADDITIONS

A. All work that would adversely affect the normal operation of the other portions of the Owner's property shall be done at a time other than normal working hours. Normal working hours shall be considered 8 a.m. to 5 p.m. Monday through Friday.

B. Interruption of existing telephone/internet service: Do not interrupt service to facilities occupied by Owner or other unless permitted under the following conditions:
   1. Notify Owner no fewer than 14 days in advance of proposed interruption of telephone service.

C. Prior to submitting bids on the project, visit the site of the work to become aware of existing conditions that may affect the cost of the project.

D. Where work under this project requires extension, relocation, reconnections or modifications to existing equipment or systems, the existing equipment or systems shall be restored to their original and operating condition. Remove all equipment indicated to be demolished, including outlets, devices, raceways and support structures.

E. Care shall be exercised in the removal and storage of equipment indicated to be relocated or removed and reused. Prior to placing back into service, equipment shall be cleaned, and all marred or chipped paint surfaces shall be touched-up.

F. Provide all coring, cutting, and patching to existing walls, floors, etc., required for the removal of existing work or the installation of new work.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. Where equipment is identified by manufacturer and catalog number, it shall be as the base of requirements for quality and performance. Where manufacturers for equipment are identified by name, the Construction Professional may submit for approval, similar equipment of other manufacturers as substitution. The Design Professional's decision as to whether the submitted equipment is acceptable shall be final and binding.

B. All changes necessary to accommodate the substituted equipment shall be made at the Construction Professional's expense and shall be as approved by the Design Professional. Detailed drawings indicating the required changes shall be submitted for approval at the time the substitution is requested.

C. If substitutions are made in lieu of device specified; form, dimension, design and profile shall be submitted to the Design Professional for approval.

D. Submit request for approval of substitute materials in writing to the Design Professional at least ten days prior to bid opening.

2.02 MATERIALS

A. All materials used in this work shall be new and shall bear the inspection label of Underwriters' Laboratories Inc. or certification by other recognized laboratory.

B. The published standards and requirements of the Telecommunications Industries Association (TIA), National Electrical Manufacturers Association (NEMA), the American National Standard Institute (ANSI), the Institute of Electrical and Electronic Engineers (IEEE), and the American Society of Testing Materials (ASTM), are made a part of these Specifications and shall apply wherever applicable.

C. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts are available.

D. When more than one unit of the same class of equipment or material is required, such units shall be the products of a single manufacturer or partner manufacturers that offer a certified solution.

E. Components of an assembled unit need not be products of the same manufacturer but must offer a certified end-to-end solution.

F. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.

G. Components shall be compatible with each other and with the total assembly for the intended service.

PART 3 - EXECUTION

3.01 EXAMINATION OF CONDITIONS

A. Prior to the start of work, the Construction Professional shall carefully inspect the installed work of other trades and verify that such work is complete to the point where installation may properly commence. Start of work indicates acceptance of conditions.

B. Install equipment in accordance with applicable codes and regulations, the original design, and the referenced standards.

C. In the event of a discrepancy, immediately notify the Project Manager.

D. Do not proceed with installation until unsatisfactory conditions and discrepancies have been fully resolved.

3.02 PROTECTION OF SYSTEMS AND EQUIPMENT

A. Protect materials and equipment from damage during storage at the site and throughout the construction period. Equipment and materials shall be protected during shipment and storage against physical damage, dirt, theft, moisture, extreme temperature, and rain.

B. Damage from rain, dirt, sun and ground water shall be prevented by storing the equipment on elevated supports and covering the sides with securely fastened protective rigid or flexible waterproof coverings.

C. During installation, equipment shall be protected against entry of foreign matter on the inside and be vacuum cleaned both inside and outside before testing, operating, or painting.

D. As determined by the Project Manager, damaged equipment shall be fully repaired or shall be removed and replaced with new equipment to fully comply with requirements of the Contract Documents. Decision of the Project Manager shall be final.

E. Damaged paint on equipment and materials shall be repainted with painting equipment and finished with the same quality of paint and workmanship as used by the manufacturer.

3.03 ACCESS TO EQUIPMENT

A. Equipment shall be installed in location and manner that will allow convenient access for maintenance and inspection.

B. Working spaces shall be not less than specified in the National Electrical Code (NEC) for voltages specified.

C. In the preparation of Drawings, a reasonable effort to accommodate acceptable equipment manufacturer's space requirements has been made. However, since space requirements and equipment arrangement vary according to each manufacturer, the responsibility for initial access, maintenance access, code required access, and proper fit rests with the Construction Professional.

D. Physical dimensions and arrangements of equipment to be installed shall be subject to the Design Professional's review.

E. Where the Project Manager determines that the Construction Professional has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled, one time only, as directed by the Project Manager, at no additional cost to the Owner. "Conveniently accessible" is defined as being capable of being reached without the use of ladders or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping, and duct work.

F. The Construction Professional shall coordinate the installation of ductwork, conduit, busway, piping, cable trays, etc., installation with lighting fixtures, special ceiling construction, air distribution equipment, and the structure. Provide additional rises, drops and offsets as required. If after installed, new ductwork, conduit, busway, piping or cable is found to be in conflict with the architecture, structure, or other trade Work which is either existing or shown on the Contract Documents, the ductwork, conduit, busway, piping or cable shall be relocated without additional cost to the Owner.

G. No conduit, equipment, cabling, etc., shall be installed in the eight (8) inch high zone directly above the ceiling in tenant areas to allow for tenant build-out and flexibility unless otherwise specifically shown on the Drawings or prior written authorization is received from the Design Professional.

H. Cabling, cable tray, etc., shall be installed in accessible locations, avoiding obstructions, preserving headroom, and keeping openings and passageways clear.

I. Minor adjustments in the locations of equipment shall be made where necessary, providing such adjustments do not adversely affect functionality of the equipment.

J. The Owner's representative will periodically review the progress of the cabling installation.

3.04 CLEANING

A. During construction, and prior to Owner acceptance of the building, remove from the premises and dispose of packing material and debris caused by communications work.

B. Remove dust and debris from interiors and exteriors of electrical equipment. Clean accessible current carrying elements prior to being energized.

3.05 COMPLETION

A. General: Upon completion of the work, remove excess debris, materials, equipment, apparatus, tools, and similar items. Leave the premises clean, neat, and orderly.

B. Results Expected: Systems shall be complete and operational, and controls shall be set and calibrated. Testing, start-up, and cleaning work shall be complete.

C. Maintenance Materials: Special tools for proper operation and maintenance of the equipment provided under this Specification shall be delivered to the Owner.

3.06 TESTING AND VERIFICATION

A. See specific Division 27 sections for testing parameters of sub-systems.

B. The Construction Professional shall verify that requirements of this Specification are met. Verification shall be through a combination of analyses, inspections, demonstrations and tests, as described below.

C. Verification by inspection includes examination of items and comparison of pertinent characteristics against the qualitative or quantitative standard set forth in the Specifications. Inspection may require moving or partially disassembling the item to accomplish the verification, included as part of the work at no additional cost to the Owner.

D. The Construction Professional shall verify by formal demonstrations or tests that the requirements of this Specification have been met. The Construction Professional shall demonstrate that the communications systems, components, and subsystems meet Specification requirements in the "as-installed" operating environment during the "System Operation Test." Even though no formal environmental testing is required, the Construction Professional shall measure and record temperature, humidity and other environmental parameters and the environmental conditions, which were encountered during the "System Operation Test."

E. The Construction Professional shall carefully plan and coordinate the final acceptance tests so that tests can be satisfactorily completed. The Construction Professional shall provide necessary instruments, labor and materials required for

tests, including the equipment manufacturer's technical representative and qualified technicians in sufficient numbers to perform the tests within a reasonable time.

F. The Construction Professional shall satisfy all items detailed in the final acceptance check-off list (punch list). The list shall be a complete representation of specified installation requirements. At the time of final acceptance punch list items shall be corrected until the system is found to be acceptable to the Owner and the Project Manager.

G. The installer will be required to repair or replace any section of cable that does not meet the specified test results. After repair, this section of cable shall be retested. For any area requiring this replace/repair and retesting, the installer shall update the original test results documentation.

H. After the Construction Professional systems have been installed and tested, the completed test plan shall be signed by the Communications Construction Professional Project Manager and submitted for approval.

I. All delivered documentation will be reviewed for completeness and compliance to the specifications. Any item that is not acceptable by the owner will be returned to the Installer, the error or omission shall be corrected by the installer and returned to the Owner in a period of 7 days.

END OF SECTION 270000

# SECTION 270510 - FIRESTOPPING FOR COMMUNICATIONS SYSTEMS

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Firestopping for Communications Systems.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

### 1.02 SUBMITTALS

A. Provide product data from manufacturer's specifications.

### 1.03 WORK INCLUDED

A. The work included under this Specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

### 1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver Products in manufacturer's original unopened containers or packages with labels intact, identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions, where applicable.

B. Store and handle materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

### 1.05 PROJECT CONDITIONS OR SITE CONDITIONS

A. Environmental Requirements:
   1. Do not install materials when temperature of substrate material and ambient air is below 60 degrees F.
   2. Maintain minimum temperature before, during, and for 3 days after installation of materials.
   3. Keep away from heat, open flame, sparks, or other sources of ignition until curing is complete. Use only with adequate ventilation.

## PART 2 - PRODUCTS

### 2.01 APPROVED PRODUCTS

A. Approved Firestopping Manufacturer(s)

   1. Flamestopper Thru-Wall Fitting - Legrand Company (Firestop Devices)

2. Unique Firestop Products (Firestop Devices)
3. Specified Technologies Incorporated (STI) (Firestop Devices, Putties, Caulks, Sealants, etc.)
4. Hilti Firestop Systems (Firestop Devices, Putties, Caulks, Sealants, etc.)
5. Nelson Firestop Products (Firestop Devices)
6. Tremco Firestop Systems (Firestop Devices, Putties, Caulks, Sealants, etc.)
7. Rectorseal (Putties, Caulks, Sealants, etc.)

2.02 TYPES OF PRODUCTS

A. Sealants

1. Intumescent Firestop Sealants and Caulks
2. Latex Firestop Sealant
3. Acrylic Water-Based Sealant
4. Silicone Firestop Sealants and Caulks
5. Firestop Putty
6. Firestop Collars
7. Wrap Strips
8. 2-Part Silicone Firestop Foam
9. Firestop Mortar
10. Firestop Pillows
11. Elastomeric Spray
12. Accessories:
13. Forming/Damming Materials: Mineral fiberboard or other type as per manufacturer recommendation

B. Firestop Devices

1. Thru-Wall Fitting (Flamestopper by Legrand)
    a. The firestop device box shall be constructed of 16 gage G90 steel.
    b. The firestop device intumescent block shall be constructed of a graphite base material with expansion starting at 375°F and an unrestrained expansion between 6 to 12 times. The intumescent block shall be held securely by the box in order to prevent tampering and damage during installation.
    c. The firestop device shall have doors which can be adjusted to prevent materials from penetrating the device if the device is empty or completely full. The doors shall be constructed of 16 gage G90 steel with No. 10-32 screws use to adjust opening size.
    d. The firestop device shall be available for 2" and 4" trade size EMT conduit.
    e. The firestop device shall be available in safety yellow powder coat, custom colors and an unpainted galvanized finish.
2. Threaded Firestop Device (Unique Firestop Products)
    a. Threaded steel sleeve device incorporating flat washers secured by threaded device shall be installed around cables. The device shall be available in 1, 2 and 4-inch sizes. Maximum diameter of the wall penetration for 1, 2 and 4-inch sizes shall be 1-1/4, 2-7/16 and 4-1/2 inches respectively.
3. Smooth Firestop Device (Unique Firestop Products)

a. Smooth steel sleeve device incorporating flat washers secured by sliding compression couplers. The device shall be available in 1, 2 and 4-inch sizes. Maximum diameter of the wall penetration for 1, 2 and 4-inch sizes shall be 1-1/4, 2-7/16 and 4-1/2 inches respectively.

4. Split-Sleeve Firestop Device (Unique Firestop Products)
   a. Threaded steel sleeve halves incorporating split couplings and slotted washers to fit the specific diameter of the opening. The device shall be available in 1, 2 and 4-inch sizes. Maximum diameter of the wall penetration for 1, 2 and 4-inch sizes shall be 1-1/4, 2-7/16 and 4-1/2 inches respectively.
5. Fire Rated Cable Pathway (STI EZ-PATH)
   a. Fire rated cable pathway device modules shall be comprised of steel raceway with intumescent foam pads allowing 0-100 percent cable fill.
   b. Capable of being retrofitted around existing cables. Capable of ganging multiple units together.
6. Ready Sleeve (STI)
   a. Sleeve kit device designed for new cabling penetrations, available in 1-inch, 2-inch, and 4-inch diameters.
   b. Kit consists of steel sleeve, steel escutcheon plates with intumescent gaskets, and firestop putty.

2.03 UL CLASSIFICATION

A. Thru-Wall Fitting - The firestop device for use in through-penetration firestop systems shall have been examined and tested by Underwriters Laboratories Inc. to UL1479 (ASTM E 814) and bear the U.S. and Canadian UL Classification Mark.

B. Threaded, Smooth and Split-Sleeve Firestop Devices - Firestopping sealants and devices shall be used together as a firestop system. All firestop systems shall bear a UL Classification system number. UL Classification system numbers are as follows:

1. Threaded Firestop System
   a. Block Wall - W-J-3049
   b. Dry Wall - W-L-3138
2. Threaded Firestop System (Vertical)
   a. Slab - F-A-3010
3. Smooth Firestop System
   a. Block Wall - W-J-3048
   b. Dry Wall - W-L-3137
4. Split-Sleeve Firestop System
   a. Block Wall - W-J-3047
   b. Dry Wall - W-L-3136

2.04 FIRESTOPPING SYSTEMS

A. Thru-Wall Fitting Firestop System:

1. The device shall be classified for use in one-, two-, three, and four-hour rated gypsum, concrete and block walls and provide a maximum L rating

of six cfm. The devices shall also been tested by Underwriters Laboratories Inc. to UL2043 and determined to be suitable for use in air handling spaces.

B. Threaded, Smooth and Split-Sleeve Firestop Systems:

1. Shall conform to both Flame (F) and Temperature (T) ratings as required by local building codes and as tested by nationally accepted test agencies per ASTM E814 or UL 1479 fire tests in a configuration that is representative of field conditions.
2. The F rating must be a minimum of one (1) hour but not less than the fire resistance rating of the assembly being penetrated. T rating shall be based on measurement of the temperature rise on penetrating item(s). The fire test shall be conducted with a minimum positive pressure differential of 0.01 inches of water column.
3. For joints, must be tested to UL 2079 with movement capabilities equal to those of the anticipated conditions.

C. Firestopping materials and systems must be capable of closing or filling through-openings created by 1) the burning or melting of combustible pipes, cable jacketing, or pipe insulation materials, or 2) deflection of sheet metal due to thermal expansion (electrical & mechanical duct work).

D. Firestopping material shall be asbestos and lead free and shall not incorporate nor require the use of hazardous solvents.

E. Firestopping sealants must be flexible, allowing for normal pipe movement.

F. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.

G. Firestopping materials shall be moisture resistant and may not dissolve in water after curing.

PART 3 - EXECUTION

3.01 CONDITIONS REQUIRING FIRESTOPPING

A. General

1. Provide firestopping for conditions specified whether or not firestopping is indicated, and if indicated, whether such material is designed as insulation, safing, or otherwise.

B. Through-Penetrations

1. Firestopping shall be installed in all open penetrations and in the annular space in all penetrations in any bearing or non-bearing fire-rated barrier.

C. Membrane-Penetrations

1. Where required by code, all membrane-penetrations in rated walls shall be protected with firestopping products that meet the requirements of third-party time/temperature testing.

D. Construction Joints/Gaps

1. Firestopping shall be provided between the edges of floor slabs and exterior walls, between the tops of walls and the underside of floors, in the control joint in masonry walls and floors and in expansion joints.

E. Smoke-Stopping

1. As required by the other sections, smoke-stops shall be provided for through-penetrations, membrane-penetrations, and construction gaps with a material approved and tested for such application.

3.02 EXAMINATION

A. Examine the areas and conditions where firestops are to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Verify that environmental conditions are safe and suitable for installation of firestop products.

C. Verify that all pipes, conduit, cable, and other items that penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.03 INSTALLATION

A. Preparation
1. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material.
2. Remove incompatible materials which may affect bond.
3. When required to properly contain firestopping materials within openings, damming or packing materials may be utilized. Combustible damming material must be removed after appropriate curing. Noncombustible damming materials may be left as a permanent component of the firestop system.

B. General

1. Installation of firestops shall be performed by an applicator/installer qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
2. Apply firestops in accordance with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations.
3. Unless specified and approved, all insulation used in conjunction with through-penetrants shall remain intact and undamaged and may not be removed.
4. Seal holes and penetrations to ensure an effective smoke seal.

5. In areas of high traffic, protect firestopping materials from damage. If the opening is large, install firestopping materials capable of supporting the weight of a human.
6. Insulation types specified in other sections shall not be installed in lieu of firestopping material specified herein.
7. All combustible penetrants (e.g. non-metallic pipes or insulated metallic pipes) shall be fire-stopped using products and systems tested in a configuration representative of the field condition.
8. All sleeves in gypsum board walls shall be installed and mechanically supported to manufacturer's recommendations.
9. Maintain percent fill of device to manufacturer's maximum rating or less.

3.04 FIELD QUALITY CONTROL

A. Prepare and install firestopping systems in accordance with manufacturer's printed instructions and recommendations.

B. Follow safety procedures recommended in the Material Safety Data Sheets.

C. Finish surfaces of firestopping that are to remain exposed in the completed work to a uniform and level condition.

D. All areas of work must be accessible until inspection by the applicable Code Authorities.

E. Correct unacceptable firestops and provide additional inspection to verify compliance with this Specification.

3.05 CLEANING

A. Clean excessive fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturer's of firestopping Products and of products in which opening and joints occur.

B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations.

C. If damage occurs, cut out and remove damaged or deteriorated firestopping and install new materials.

3.06 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION 270510

# SECTION 270526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Grounding and Bonding for Communications Systems.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

### 1.02 SUBMITTALS

A. Provide product data from manufacturer's specifications.
B. Provide resistance testing results as outlined in Part 3

### 1.03 WORK INCLUDED

A. The work included under this Specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

## PART 2 - PRODUCTS

### 2.01 APPROVED PRODUCTS

A. Approved Equipment Grounding Conductor Manufacturer(s)

1. Southwire
2. Belden
3. West Penn
4. Anixter
5. Okonite
6. General Cable

B. Approved Grounding Lug Manufacturer(s)

1. 3M
2. Burndy
3. Buchanan
4. Thomas & Betts
5. Chatsworth Products, Inc.

C. Approved Grounding Busbar Manufacturer(s)

1. Chatsworth Products, Inc.
2. B-Line/Cooper
3. Harger
4. Burndy
5. Legrand

2.02 GROUNDING CONDUCTORS

A. Grounding Conductor

1. Construction shall be Type THHN copper conductors, insulated with heat and moisture resistant PVC over which a UL listed jacket is applied.
2. Jacket color shall be green or black. Black jacketed cable shall be identified at each termination point with a wrap of green tape.

2.03 GROUNDING LUGS

A. Grounding Lugs and Hardware

1. Grounding lugs shall be 2-hole and installed with a crimper that when properly executed the die of the crimper impresses the die # on the lug base. All lugs shall be sleeved with clear heat-shrink to allow for inspection of the crimp. Silicon bronze or stainless-steel bolts and washers shall be used to install lugs to equipment. Exothermic welding is also allowed.

2.04 GROUNDING BUSBARS

A. Grounding Busbar

1. The grounding busbar shall be made of 1/4" thick solid copper.
2. The grounding busbar shall be installed with minimum clearance from mounting surface, 1" offsets and 1-1/2" insulators.
3. The grounding busbar shall accommodate 2-hole compression lugs.
4. The grounding busbar shall meet or exceed ANSI/TIA-607-D requirements.
5. Telecommunications main grounding busbar (TMGB) / Primary Bonding Busbar (PBB)
   a. Minimum size will be **4 inch H x 0.25 inch W x 24 inch L**. The TMGB/PBB shall be mounted as close as possible to the building grounding electrode system busbar to keep the Telecom Bonding Conductor (TBC) as straight and as short as possible.
6. Telecommunications grounding busbar (TGB) / Secondary Bonding Busbar (SBB)
   a. Minimum size will be 2 inch H x 0.25 inch W x 12 inch L.

PART 3 - EXECUTION

3.01 GROUNDING

A. The facility shall be equipped with a Communications Bonding Backbone (TBB). This backbone shall be used to ground all communications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor. The TBB shall be installed

independent of the building's electrical and building ground and shall be designed in accordance with the recommendations contained in the ANSI/TIA-607-D Telecommunications Bonding and Ground Standard.

B. The main entrance facility/equipment room in each building shall be equipped with a telecommunications main grounding busbar (TMGB) / Primary Bonding Busbar (PBB). Each telecommunications room (TR) shall be provided with a telecommunications ground busbar (TGB) / Secondary Bonding Busbar (SBB). The TMGB/PBB shall be connected to the building electrical entrance grounding facility. Project drawings shall indicate whether telecommunication ground busbars are provided by electrical contractor or by telecom contractor.

C. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the MC/IC/TC shall be grounded to the respective TGB/SBB or TMGB/PBB using a minimum #6 AWG stranded copper bonding conductor and compression lugs.

D. All wires used for communications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap or green tape. All cables and busbars shall be identified and labeled in accordance with the ANSI/TIA-606-C.

E. Each 2-lug compression connector shall have antioxidant coating applied to lug and busbar prior to attachment.

F. The maximum value of resistance between any point in the Telecommunications bonding system and the building electrical grounding electrode system shall be 100 Milliohms or .1 ohm to comply with TIA-607-D standard. This result shall be provided as testing submittal to the EOR.

3.02 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION 270526

# SECTION 270528 - PATHWAYS FOR COMMUNICATIONS SYSTEMS

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Pathways for Communications Systems.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

D. Refer to Division 26 specifications for conduit and wireway requirements

### 1.02 SUBMITTALS

A. Provide product data from manufacturer's specifications.
B. Coordination Drawings: Pathway routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
   1. Structural members in paths of pathway groups with common supports.
   2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
   3. Underground ducts, piping, and structures in location of underground enclosures and handholes.

### 1.03 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all the required material whether specifically addressed in the Specification or not.
B. The scope of work shall be included as follows:
   1. Low Voltage Conduit System- reference project electrical drawings and specifications.
   2. Telecom contractor shall furnish and install the complete Cable Tray System as indicated on Low Voltage drawings.
   3. Telecom contractor shall furnish and install all Velcro straps and plastic tie-wraps (plenum rated).

## PART 2 - PRODUCTS

### 2.01 APPROVED PRODUCTS

A. Innerduct/Inner-Conduit Channel Manufacturer(s)

   1. Carlon

2. Endot Industries
3. MaxCell
4. Petroflex
5. Eastern

B. Approved Cable Tray System and Basket Tray System Manufacturer(s)

1. Commscope
2. Flex Tray
3. Wiremold
4. Legrand
5. Hubbell
6. EZ Tray
7. Mono Systems, Inc.
8. Snake Tray
9. B-Line
10. Gulf Coast Systems

C. Approved Cable Hanger Manufacturer(s)

1. Erico Products – Caddy
2. B-Line (Eaton)
3. Panduit
4. Legrand
5. Or Approved Equal

D. Approved Tie Wrap/Velcro Strap Manufacturer(s)

1. Leviton
2. Panduit
3. Hellerman-Tyton
4. Or Approved Equal

2.02 CABLE TRAY

A. Cable Tray System

1. Cable tray shall be steel or aluminum construction.
2. Cable tray cross members shall be factory welded at 12" intervals maximum.
3. Cable tray shall be equipped with one (1) or two (2) support rails that run the length of each segment.
4. End caps shall be installed on the exposed ends of the cable tray, channel supports and bolts. Protective covers shall be installed on threaded rods that may come in contact with cabling plant.
5. Wall mount cable tray used in limited clearance areas shall be hook style and constructed of aluminum.
6. See Drawings for cable tray dimensions.
   a. Cable Tray color shall be black.

2.03 CABLE HANGERS

A. J-Hooks

1. J-hooks shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables. J-hook shall be UL Listed and shall comply with TIA-569-D.
2. J-hooks shall have flared edges to prevent damage while installing cables.
3. J-hooks sized 1 5/16" and larger shall have a cable retainer strap to provide containment of cables within the hanger. The cable retainer strap shall be removable and reusable and be suitable for use in air handling spaces.

B. Adjustable Non-Continuous Cable Support Sling

1. Constructed from steel and woven laminate; sling length can be adjusted to hold up to 425 4-pair balanced twisted pair cables; rated for indoor use in non-corrosive environments. Rated to support Category 5e and higher cable, or optical fiber cable. Cable support sling shall be UL Listed.
2. Adjustable non-continuous cable support sling shall have a static load limit of 100 lbs.
3. Adjustable non-continuous cable support sling shall be suitable for use in air handling spaces.

2.04 TIE WRAPS AND VELCRO STRAPS

A. Tie Wraps and Velcro Straps

1. Cables shall be fastened to support structures with tie wraps/Velcro straps.
2. Tie wraps must be carefully installed so that cable is not deformed.
3. Only Velcro straps shall be used in telecommunications rooms.
4. Tie wraps/Velcro straps installed in air handling spaces must be plenum rated.
   a. Non-plenum Tie Wrap color shall be black.
   b. Plenum Tie Wrap color shall be red.
   c. Non-plenum Velcro strap color shall be black.
   d. Plenum Velcro strap color shall be red.

2.05 INNERDUCT

A. Innerduct

1. Innerduct shall be corrugated plastic equipped with pull-string or mule tape.
2. Inner-conduit channel (MaxCell) shall be 3-channel with each channel equipped with mule tape.
3. See Drawings for innerduct / inner-conduit channel (MaxCell) details.

PART 3 - EXECUTION

3.01 PENETRATIONS

A. Holes through concrete and masonry in new and existing structures shall be cut with a diamond core drill or concrete saw upon approval of the structural engineer of record for the base of building. Pneumatic hammer, impact electric, hand or manual hammer type drills shall not be allowed, except where permitted by the Project Manager as required by limited working space. X-ray all floor penetrations accordingly.

B. Holes shall be located so as not to affect structural sections such as ribs or beams.

C. Holes shall be laid out in advance. The Project Manager shall be advised prior to drilling through structural sections, for determination of proper layout.

D. Structural Penetrations: Where conduits, wireways and other raceways pass through fire partitions, fire walls or walls and floors provide a code compliant effective barrier against the spread of fire, smoke and gases.

E. All penetrations where conduit is not used shall be sleeved.

F. No gaps or rough edges shall be allowed between wall and conduit/sleeve.

3.02 CONDUIT SYSTEM

A. Conceal all conduits, except in unfinished spaces such as equipment rooms or as indicated by symbol on the Drawings.

B. Leave all empty conduits with a 200-pound test nylon cord pull line.

C. Flattened, dented, or deformed conduits are not permitted and shall be removed and replaced.

D. Fasten conduit support device to structure with wood screws on wood, toggle bolts on hollow masonry, anchors as specified on solid masonry or concrete, and machine bolts, clamps, or spring steel clips, on steel.

E. Install conduit with wiring, including homeruns as indicated on the Drawings. Any change resulting in a savings in labor or materials is to be made only in accordance with a contract change. Deviations shall be made only where necessary to avoid interferences and when approved by Engineer by written authorization.

F. Conduit shall be run parallel or at right angles to existing walls, ceilings, and structural members.

G. Attach backbone conduits larger than one-inch trade diameter to or from structure on intervals not exceeding twelve feet with conduit beam clamps, one-hole conduit straps or trapeze type support.

H. Where conduits must pass through structural members obtain approval of Architect.

I. Install all conduits or sleeves penetrating or routed within rated firewalls or fire floors to maintain fire rating of wall or floor. Conduit shall not be installed in rated

floors or walls if it compromises or violates the fire rating of floor or wall. Refer to architectural documents.

J. Provide expansion and deflection coupling where conduit passes over a building expansion joint.

K. All other conduit, unless specified herein, shall be electrical metallic tubing (EMT) or electrical non-metallic tubing (ENT). PVC conduit is not allowed in exposed or concealed areas, but only within concrete.

L. Conduit Installations Within Slab/Floor

1. Conduit shall be run following the most direct route between points.
2. Conduit shall not be installed in concrete where the outside diameter is larger than 1/3 of the slab thickness.
3. Protect each metallic conduit installed in concrete slab or conduits 1-1/2 inch and smaller passing through a concrete slab against corrosion where conduit enters and leaves concrete by wrapping conduit with vinyl all-weather electrical tape.
4. Protect all conduits entering and leaving concrete floor slabs from physical damage during construction.
5. Provide expansion fittings in all conduits where length or run exceeds 200 feet or where conduits pass through building expansion joints.
6. Install all conduits penetrating or routed within rated fire floors to maintain the fire rating of the floor. Conduit shall not be installed in rated floors or walls if it compromises or violates the fire rating of floor or wall. Refer to architectural documents.
7. Conduits installed within concrete floor slabs which are in direct contact with grade or which penetrate the building roof shall be galvanized rigid steel (G.R.S.), intermediate metal conduit (I.M.C.) or Schedule 40, heavy wall PVC.

M. Communications cables shall not occupy conduits with power cables.

N. Metallic conduits shall be grounded in accordance with ANSI/TIA-607-D.

O. Conduit runs shall not have more than two (2) 90-degree bends between pull points.

P. Communications conduit system shall contain no condulets (also know as an LB) unless where specifically noted on drawings.

A. Rigid metal conduit (RMC) or intermediate metal conduit (IMC) shall be used for entrance conduits that exceed 50 feet into the building.

B. Horizontal Conduits

1. Support horizontal conduits at intervals not exceeding ten feet and within three feet of each outlet, junction box, backboard, enclosure, or cabinet. Support conduits from structural steel members with spring steel type or beam conduit clamps and to non-metallic structural members with one-hole conduit straps. For exposed conduits and where conduits must be

suspended below structure, single conduit runs shall be supported from structure by hanger rod and conduit clamp assembly, and multiple conduits shall be supported by trapeze type support suspended from structure. Do not attach conduits to ceiling suspension system channels or suspension wires.

2. For runs that total more than 100 feet in length, insert pull boxes so that no segment between boxes exceeds the 100 feet limit.
3. Each horizontal home-run conduit can serve from one (1) to three (3) outlet boxes. For one (1) outlet box, a 3/4" conduit shall be used, minimum. For two (2) outlet boxes, a 1" conduit shall be used, minimum. For three (3) outlet boxes, a 1-1/4" conduit shall be used, minimum.

3.03 COMMUNICATIONS OUTLET BOXES

A. Exact locations of the outlet boxes shall be coordinated with the electrical contractor and other trades.

B. Non-metallic communications outlet boxes may only be used for wood frame construction and/or where code allows.

C. The approximate locations of the outlets are indicated on the Drawings. The exact locations of outlets shall be determined at the building. The right is reserved to change, without additional cost, the exact location of any outlet, a maximum of 10' before it is permanently installed.

D. Orientation of outlet boxes (horizontal or vertical) shall be as indicated on the architectural elevations.

E. Install all outlet boxes in finished areas flush with the wall. Maintain 1/4" or less space between outlet box front and finished wall surface.

F. Outlet boxes shall be firmly anchored in place and shall not depend on the coverplate to hold it secure to the wall.

G. Outlet boxes installed back-to-back in fire-rated walls shall be separated horizontally by a minimum of 24".

3.04 PULL BOXES

A. Pull boxes shall be secured, independent of the conduit entries into the box. Pull boxes shall be secured to the building structure. In ceiling applications, pull boxes shall not be supported with ceiling wires.

B. Pull boxes shall be sized per NFPA 70

C. Conduits entering pull boxes shall connect to pull boxes using die-cast zinc connectors.

D. Pull boxes shall be free from burrs, dirt, and debris.

E. Pull boxes shall be installed in accordance with ANSI/TIA-569-D.

F. Pull boxes shall be grounded in accordance with ANSI/TIA-607-D.

3.05 CABLE TRAY SYSTEM

A. Install trays in accordance with recognized industry practices, to ensure that the cable tray equipment complies with requirements of the NEC.

B. All open trays shall be installed a minimum of six (6) inches away from any light fixture.

C. Provide external grounding strap at expansion joints, sleeves, crossover, and other locations where tray continuity is interrupted.

D. Support all pathways from building construction. Do not support pathways from ductwork, piping, or equipment hangers.

E. Install cable tray level and straight.

F. Provide all hardware, accessories, fasteners, anchors, threaded rods, and support channels required to provide a complete cable tray system.

G. Cable trays shall not be used to house both low voltage and power cables unless cables are separated by a grounded physical barrier.

H. Cable tray system shall be grounded in accordance with ANSI/TIA-607-D.

3.06 CABLE HANGERS

A. Installation and configuration shall conform to the requirements of ANSI/TIA-568-C.0, ANSI/TIA-568-C.1 & ANSI/TIA-569-D, NFPA 70 (National Electrical Code), applicable local codes, and to the manufacturer's installation instructions.

B. Install cables using techniques, practices, and methods that are consistent with Category 5e or higher requirements and that supports Category 5e or higher performance of completed and linked signal paths, end to end.

C. Install cables without damaging conductors, shield, or jacket.

D. Allow 25% future capacity with exceeding design capacity limits.

E. Provide a hanger at each change of direction.

F. Shall be supported by dedicated support wires. Do not use ceiling grid support wire or support rods.

G. Hook spacing shall be no more than 5' . Install randomized between 4' and 5' to prevent inductive resonance.

H. Do not bend cables, in handling or in installing, to smaller radii than minimums recommended by manufacturer.

I. Pull cables without exceeding cable manufacturer's recommended pulling tensions. Use pulling means that will not damage media.

J. Do not exceed load ratings specified by manufacturer.

K. Adjustable non-continuous support sling shall have a static load limit of 100 lbs.

L. To avoid electromagnetic interference (EMI), pathways shall provide minimum clearances of four feet from motors or transformers, one foot from conduit and cables used for electrical power distribution, and five inches from fluorescent lighting. Pathways shall cross perpendicular to fluorescent lighting and electrical power cables or conduits.

3.07 TIE WRAPS AND VELCRO STRAPS

A. Tie wraps/Velcro straps shall be installed around cables at intervals of 12" minimum.

B. Do not over-cinch cables.

3.08 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION 270528

# SECTION 270553 - IDENTIFICATION FOR COMMUNICATIONS SYSTEMS

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the equipment and execution requirements relating to Identification for Communications Systems.

C. Equipment specifications, general considerations, and guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

### 1.02 WORK INCLUDED

A. The work included under this Specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

## PART 2 - LABELING

### 2.01 LABELING REQUIREMENTS

A. Labeling shall be done in accordance with the recommendations made in the ANSI/TIA-606-C document, manufacturer's recommendations, and best industry practices unless indicated otherwise by owner's IT representative.

B. Coordinate labeling with owner's IT representative.

C. All spaces, pathways, outlets, cables, termination hardware, grounding system and equipment shall be labeled with machine-generated labels. Provide labels at the following specific locations and any additional locations indicated on the project drawings:

1. Rack frames
2. Cabinet frames
3. Device face plates.
4. Port on front and at rear of each patch panel
5. Horizontal cable in ceiling above (or below) outlet.
6. Horizontal cables at poke through locations (both sides).
7. Horizontal cables at rear of patch panel.
8. Ends of spare cable that is not terminated.
9. All 110 blocks.

D. Generally, riser and horizontal cables shall contain labels indicating room numbers (to and from) numbers and a unique name.

E. All labels shall be clear with black text.

F. All cables shall be labeled with machine generated, adhesive-backed, wrap around vinyl labels in black uppercase lettering on machine generated permanent adhesive self-laminating label of contrasting color from cable sheath..

G. For large cable bundles, label shall be installed on a plastic label holder and tie-wrapped to bundle.

H. A total of three (3) labels per horizontal cable are required at the following intervals: 6" from outlet; 18" from outlet' 12" from termination block/patch panel.

I. Labeling scheme shall be alphanumeric.

J. Provide label reference chart in the IDF room indicating the following information:

1. Data patch panel outlet port information
2. Voice riser cross connect information.
3. Voice outlet cable pair termination.

K. Label file used to generate labels shall be turned over to the owner as part of the final documentation package.

PART 3 - NOT USED

END OF SECTION 270553

# SECTION 270800 - COMMISSIONING OF COMMUNICATIONS

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the equipment and execution requirements relating to Commissioning of Communications.

C. Equipment specifications, general considerations, and guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

### 1.02 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

## PART 2 - TESTING

### 2.01 TESTING REQUIREMENTS

A. General

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA-568-C.0, ANSI/TIA-568-C.1, and/or ANSI/TIA-1152. All conductors and/or strands of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors and/or strands in all cables installed.
2. Test results shall be submitted to EOR for approval and shall be included in the close-out documentation.
3. Cable test parameters shall be set to the manufacturers values for NVP and test limit.

B. Copper Testing

1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required to verify Category 5e, Category 6, or Category 6A performance depending on type of cable installed. Horizontal balanced twisted pair cabling shall be tested using a level III, or IV test unit for category 5e/6/6A performance compliance.

2. Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity, and pair-reversals, crossed pairs and split pairs. The test shall be recorded as pass/fail as indicated by the test unit and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.
3. Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA-568-C.2 Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.
4. High bandwidth links – CAT6A cables or cables indicated in the drawing package as high bandwidth shall be tested with additional test showing parameters;
   a. Delay Skew
   b. DC Loop Resistance
   c. Insertion Loss
   d. Return Loss
   e. NEXT
   f. Alien Cross-talk
5. Approved tester is as follows:
   Fluke DSX
   Others as Approved

C. Fiber Testing (where installed)

1. All fiber testing shall be performed on all fibers in the completed end-to-end system. There shall be no splices unless clearly defined in the Drawings. These tests also include continuity checking of each fiber.
2. The fiber testers and test heads shall have passed calibration within one year of actual test date. Any calibration in excess of one year is not acceptable. Each test set and fiber head must have the recent calibration paper printout from the calibration lab for inspection by EOR, prior to testing. The calibration printout must show actual serial numbers of test sets (main and remote and each fiber tested).
3. Test Reference Cords (TRC's) must be used. Test Reference Cord verification must be shown in the final test result submission.
4. Tier 1, Tier Method B (one jumper) and Tier 2 OTDR testing is required. The Tier 2 OTDR requires bi-directional testing.
5. The installer shall Set a Reference based on Method B (Single Jumper) which includes both mated connector losses and the loss of the link under test.
6. The installer shall perform Tier 1 Testing with Optical Loss Test Set (OLTS) that includes testing for length.
7. The installer shall perform Tier 2 testing with OTDR to show all splices.
8. The supplier shall perform Bi-directional testing on all installed fiber optic cabling. Supplier test equipment shall perform testing of fiber in accordance with the fiber type being tested, TIA-526-7 for Single mode fiber.

9. All fiber strands will be tested bi-directionally. Any fiber test results that only show testing in one direction will be rejected.
10. Single mode fiber optic cable shall be tested bi-directionally at 1310 nm and 1550 nm.
11. Cable tester test parameter shall be set to correct values for:
    a. Actual manufacturer of fiber being installed. Tester to be specific to the manufacturer's model of fiber cable being tested; tester cannot be a generic fiber type.
    b. Index of Refraction based on manufacturer specifications for cable type being tested.
    c. Quantity of adapters: Test Method B, one Jumper, 2 adapters.
    d. Fiber Type.
    e. Test to Tier 1 as mandated by TIA-568-C.4.
12. Fiber optic cables shall pass all attenuation tests referenced to formulas presented in the listed standards.
13. Perform end-to-end tests of each fiber optic backbone cable as follows (applies to CCR/TR/TE applications only):
    a. Tier 1 Test: Light Source Power meter tests per TIA-568-C specification.
    b. Optical Time Domain Reflectometer (OTDR) tests per TIA-568-C specification including all addendums.
    c. Performing one test and not the other does not satisfy a complete fiber test. Both tests must be submitted in one file, all at the same time.
    d. Measured effective cable run length.
14. Optical photographs of each fiber end shall be submitted for documentation and warranty purposes.
15. Approved optical fiber test equipment manufacturers are as follows:
    a. Power Meters & Light Sources
       Optical Wavelength Laboratories (OWL)
       Noyes
       Photonix
       Fluke
       Agilent
    b. Optical Time Domain Reflectometers (OTDR)
       GN Nettest
       Agilent
       Fluke
       Anritsu
       Tektronix

D. Coaxial Testing (where installed)

1. Sweep testing of each reel of coaxial cable shall be performed over the 5 MHz through 1 GHz range by the cable manufacturer for transmission and structural return loss and be so certified in writing by the cable manufacturer.
2. Verification testing with a verification field test instrument will determine shorts, continuity, termination location and length of cable.
3. Approved testers are as follows:
   Fluke DTX

4. Signal strength measurement shall be performed with a field strength meter.
5. Signal level at each outlet will be +5 dBmv, + 3 dB.

E. Test Results

1. Test documentation shall be provided on disk or flash drive as part of the as-built package. The disk or flash drive shall be clearly marked on the outside front cover with the words "Project Test Documentation," the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair (or strand) and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.
2. The field test equipment shall meet the requirements of ANSI/TIA-568-C.2, ANSI/TIA-568-C.3, and/or ANSI/TIA-1152.
3. Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. Alternately, the Contractor may furnish the test results in electronic form as defined by the Specification and be of a format readable from Microsoft Word.
4. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

PART 3 - DOCUMENTATION, AS-BUILTS, TRAINING AND RECORDS

3.01 DOCUMENTATION & AS-BUILTS

A. As-Built record documentation for communications work shall include:

1. Cable routing and identification
2. System function diagrams
3. Manufacturers' description literature for equipment
4. Connection and programming schedules as appropriate
5. Equipment material list including quantities
6. Spare parts list with quantities
7. Details not on original Contract Documents
8. Test results
9. Warranties
10. Release of liens

B. The Contractor shall provide and maintain at the site a set of prints on which shall be accurately shown the actual installation of all work under this section, indicating any variation from contract drawings, including changes in pathways, sizes, locations, and dimensions. All changes shall be clearly and completely indicated as the work progresses.

C. Progress prints shall be available for inspection by the Owner or any of his representatives and may be used to determine the progress of communications infrastructure work.

D. At the completion of the work, prepare a new set of as-built drawings, of the work as actually noted on the marked-up prints, including the dimensioned location of all pathways.

E. Furnish as-built drawings and documentation to the Project Manager. As-built drawings shall be generated in AutoCad 2015 or later. Submit as-built drawings electronically and hard copy.

3.02 OPERATIONS AND MAINTENANCE MANUAL

A. After completion of the work, the Contractor shall furnish and deliver to the Engineer three (3) copies of a complete Operations & Maintenance Manual. A system wiring diagram shall be furnished for each separate system. Documents may be delivered in electronic format only, if prior authorization is obtained from the Owner.

B. The manual shall be subdivided into separate sections with tab dividers to identify subsystems of the integrated system. Reference appropriate Specification sections.

C. Provide the following additional information for each electronic system. Information shall be edited for this project where applicable.

1. Operations manuals for components and for systems as a whole
2. Maintenance manuals for components and for system as a whole
3. Point-to-point diagrams, cabling diagrams, construction details and cabling labeling details
4. List of spare parts, materials and suppliers of components. Provide name, address, and telephone number for each supplier.
5. Emergency instructions for operational and maintenance requirements
6. Delivery time frame for replacement of component parts from suppliers
7. Recommended inspection schedule and procedures for components and for system as a whole
8. List of spare parts, materials, and suppliers of components. Provide name, address, and telephone number for each supplier.
9. Complete “reviewed” shop drawings and product data for components and system as a whole
10. Troubleshooting procedures for each system and for each major system component

3.03 TRAINING

A. The Contractor shall be responsible for training of facility personnel. Training shall take place after occupancy and before acceptance and shall include programs for on-site operations and maintenance of technology and communications systems. Training shall be for not more than ten (10) people, shall be held at the Owner's site and shall be of sufficient duration and depth to ensure that the

trained personnel can operate the installed systems and can perform usual and customary maintenance actions.

B. Training sessions shall be recorded and a copy of the recording provided to the Owner.

3.04 WARRANTY

A. General

1. All equipment is to be new and warranted free of faulty workmanship and damage.
2. Replacement of defective equipment and materials and repair of faulty workmanship within 24 hours of notification, except emergency conditions (system failures), which must be placed back in service within eight (8) hours of notification, all at no cost to the Owner.
3. The minimum warranty provisions specified shall not diminish the terms of individual equipment manufacturer's warranties.

B. Voice & Data Structured Cabling

1. Manufacturer(s) shall provide a **minimum** 25-year warranty for components used in the installed Voice & Data Structured Cabling System. Defective and/or improperly installed products shall be replaced and/or correctly installed at no cost to the Owner.

C. Coaxial Cabling Infrastructure (where installed)

1. Manufacturer(s) shall provide a minimum 1-year warranty for components used in the installed Coaxial Cabling Infrastructure. Defective and/or improperly installed products shall be replaced and/or correctly installed at no cost to the Owner.

D. Pathway & Support Infrastructure

1. Manufacturer(s) shall provide a minimum 1-year warranty for components used in the installed Pathway & Support Infrastructure. Defective and/or improperly installed products shall be replaced and/or correctly installed at no cost to the Owner.

END OF SECTION 270800

# SECTION 271116 - COMMUNICATIONS CABINETS, RACKS AND ENCLOSURES

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Cabinets, Racks, Enclosures, and Telecom Room Backboards.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

### 1.02 SUBMITTALS

A. Provide product data from manufacturer's specifications.

### 1.03 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all the required material whether specifically addressed in the Specification or not.

B. The work shall include the furnishing and installation of the following as a minimum: Equipment Cabinets, Equipment Racks, Telecom Room Backboards.

## PART 2 - PRODUCTS

### 2.01 APPROVED PRODUCTS

A. Approved Equipment Rack/Cabinet Manufacturer(s)

1. Chatsworth Products, Inc.
2. Commscope
3. Bud
4. Hoffman
5. Great Lakes
6. Lowell
7. Eaton
    a. Tripp-Lite
8. Panduit
9. Legrand
    a. Middle Atlantic
    b. Ortronics
10. No Exceptions

B. Un-approved Equipment

1. Nave Point is not a approved manufacturer or alternate

2.02 EQUIPMENT RACKS/CABINETS

A. Equipment Racks

1. The equipment rack shall be constructed of high strength, lightweight aluminum.
2. The vertical rails of the equipment rack shall be equipped with the EIA hole pattern.
3. Rack shall be: 2-post. Provide any 4-post racks where noted on the drawings.
4. Rack shall be: 7'H x 19"W floor mounted.
5. Rack color shall be black.

PART 3 - EXECUTION

3.01 EQUIPMENT RACKS/CABINETS

A. Each rack shall be provided with an installation kit and isolation pads for securing and isolating the rack to and from the floor.

B. Equipment racks/cabinets shall be installed as per the requirements specified by the manufacturer's installation guidelines.

C. Equipment racks/cabinets shall be placed with a minimum of 36-inch clearance from the walls from the front and rear of the rack or as indicated on Drawings.

D. All equipment racks/cabinets shall be grounded to the equipment grounding bar installed in the rack with a dedicated jumper.

E. All racks/cabinets shall be installed with dedicated ground bars installed on the rack. The ground bars shall be bonded to the telecom bonding bar in the room.

F. Mounting screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.

3.02 BACKBOARDS

A. Backboards shall be 3/4" void free plywood A/C rated with C side installed against wall. Size of backboard shall be 4' x 8' unless noted differently on Drawings. Backboards shall be painted with two (2) coats of white or gray fire-retardant paint, including full perimeter of backboard. Fire rated backboards are permitted in lue of painted backboards, rating label shall remain visible after equipment installation and shall not be painted over.

3.03 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION 271116

# SECTION 271119 - COMMUNICATIONS TERMINATION BLOCKS AND PATCH PANELS

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Termination Blocks and Patch Panels.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

### 1.02 SUBMITTALS

A. Provide product data from manufacturer's specifications.

### 1.03 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

## PART 2 - PRODUCTS

### 2.01 APPROVED PRODUCTS

A. Approved Patch Panel Manufacturer(s)

1. Leviton
2. Commscope
3. Siemon
4. Hubbell
5. Legrand
6. Panduit
7. No Exceptions

B. Approved Optical Fiber Enclosure Manufacturer(s)

1. AFL
2. Corning
3. Commscope
4. Siemon
5. Hubbell
6. Legrand
   a. Ortronics
7. Panduit

8. No Exceptions

C. Approved Termination Block Manufacturer(s)

1. Leviton
2. Commscope
3. Siemon
4. Hubbell
5. Legrand
6. Panduit
7. No Exceptions

D. Approved Cable Management Manufacturer(s)

1. Leviton
2. Commscope
3. Siemon
4. Hubbell
5. Legrand
6. Panduit
7. No Exceptions

E.

2.02 PATCH PANELS

A. Category 6 Patch Panel

1. The Category 6 patch panel shall be compatible with 19" equipment racks, cabinets or wall mount brackets.
2. The Category 6 patch panel shall be equipped with 8-position modular ports and shall allow for termination using both T568A and T568B wiring schemes.
3. The Category 6 patch panel shall be equipped with front labeling space to facilitate port identification.
4. The connector module shall meet or exceed the Category 6 performance criteria per ANSI/TIA-568-C.2.

PART 3 - EXECUTION

3.01 PATCH PANELS

A. Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568-C.0 and/or ANSI/TIA-568-C.1, manufacturer's recommendations and best industry practice.

B. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).

C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

D. Cables shall be neatly bundled and dressed to their respective patch panel. Each patch panel shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

E. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

F. Install manufacturer supplied strain relief bar assemblies for every 12, 24 and 48 port rear copper terminations. Secure cable with hook and loop cable straps. Plastic tie wraps are not acceptable.

3.02 OPTICAL FIBER PANELS/ENCLOSURES

A. Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568-C.0 and/or ANSI/TIA-568-C.1, manufacturer's recommendations and best industry practices.

B. Each cable shall be individually attached to the respective splice enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.

C. Bend radius of the optic fiber cable in the panel/enclosure shall not exceed 10 times the outside diameter of the cable.

D. Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.

E. Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.

3.03 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION 271119

# SECTION 271123 - COMMUNICATIONS CABLE MANAGEMENT AND LADDER RACK

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Cable Management and Ladder Rack.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

### 1.02 SUBMITTALS

A. Provide product data from manufacturer's specifications.

### 1.03 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

## PART 2 - PRODUCTS

### 2.01 APPROVED PRODUCTS

A. Approved Horizontal Cable Management Manufacturer(s)

1. Leviton
2. Ortronics (Legrand) Corporation.
3. CommScope
4. Siemon
5. Chatsworth
6. Panduit
7. No Exceptions

B. Approved Vertical Cable Management Manufacturer(s)

1. Leviton
2. Ortronics (Legrand) Corporation.
3. CommScope
4. Siemon
5. Chatsworth
6. Panduit
7. No Exceptions

C. Approved Ladder Rack System Manufacturer(s)

1. Chatsworth Products, Inc.
2. Hoffman
3. Eaton
4. Middle Atlantic
5. No Exceptions

D. Approved Tie Wrap/'Hook-Loop' Strap Manufacturer(s)

1. Velcro
2. Leviton
3. Hellerman Tyton
4. Or Approved Equal

2.02 CABLE MANAGEMENT - HORIZONTAL

A. Horizontal Cable Management

1. The horizontal wire manager shall be compatible with 19-inch equipment racks, cabinets, or wall mount brackets.
2. The horizontal cable manager shall provide support for patch cords at the front of the panel.
3. The horizontal cable manager shall be 2 rack-units in height when matched with a 2 rack-unit patch panel or switch.
4. The horizontal cable manager shall be 1 rack-unit in height when matched with a 1 rack-unit patch panel or switch.

2.03 CABLE MANAGEMENT - VERTICAL

A. Vertical Cable Management

1. The vertical cable manager shall be double-sided.
2. The vertical cable manager shall provide support for patch cords at the front of the rack and wire management at the rear of the rack.
3. The vertical cable manager shall be a minimum width of 4", refer to drawing for rack elevations
4. Vertical cable manager color shall be black.

2.04 LADDER RACKS

A. Ladder Rack System

1. See Drawings for ladder rack system details.
2. NEMA LOAD/Span Class 20C
3. Straight Section Rung Spacing: 9 inches on center
4. The ladder rack system shall be securely mounted with hardware designed for use in ladder rack systems.
5. Provide approved manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps. Obtain cable tray components from a single manufacturer.

6. End caps shall be installed on the exposed ends of the ladder racks, channel supports and bolts. Protective covers shall be installed on threaded rods that contact cabling plant.
7. Provide Drop-Out Shields where cables enter/exit tray.
8. Ladder Rack System color shall be black
9. Ladder Rack System shall be bonded to the Telecom Ground system and bonding jumpers shall be installed between the joints of the Ladder Rack System,
10. Inside radius of fittings 24" min. unless otherwise shown on drawings.

2.05 VELCRO STRAPS

A. Velcro Straps

1. Backbone cables shall be fastened to support structures with Velcro straps.
2. Horizontal cables shall be fastened to support structures with Velcro straps.
   a. Velcro Strap color shall be black, unless noted to match jacket color in the drawings

PART 3 - EXECUTION

3.01 CABLE MANAGEMENT - HORIZONTAL

A. Horizontal cable managers shall be installed below patch panels in a 1:1 ratio (one horizontal cable manager per patch panel) or as indicated on Drawings.

3.02 CABLE MANAGEMENT - VERTICAL

A. Vertical cable managers shall be installed on both sides of a single equipment rack. Where two (2) or more racks are positioned in a row, vertical cable managers shall be installed between each rack and each end of the row.

3.03 LADDER RACKS

A. Ladder rack system shall be installed straight, level, and perpendicular to walls and ceiling slabs.

B. Ladder racks shall be supported at 5' intervals maximum.

C. Provide all hardware, accessories, fasteners, anchors, threaded rods and support channels required to provide a complete ladder rack system.

D. See Drawings for ladder rack system details.

E. Provide Engraved Nameplates: 1/2 inch high black letters on yellow laminated plastic nameplate, engraved with the following wording:

WARNING! DO NOT USE CABLE TRAY AS WALKWAY, LADDER, OR SUPPORT. USE ONLY AS MECHANICAL SUPPORT FOR CABLES!

3.04 VELCRO STRAPS

A. Velcro straps shall be installed around cables at intervals of 12" minimum -24" maximum.

B. Do not over-cinch cables.

3.05 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION 271123

# SECTION 271126 - COMMUNICATIONS RACK MOUNTED POWER DISTRIBUTION

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Rack Mounted Power Distribution.

C. Product Specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

D. Refer to drawings for managed/switched PDUs model number if specified, if not provide PDUs as indicated in this section.

### 1.02 SUBMITTALS

A. Provide product data from manufacturer's specifications.

### 1.03 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all required material whether specifically addressed in the Specification or not.

## PART 2 - PRODUCTS

### 2.01 APPROVED PRODUCTS

A. Approved Power Distribution Unit Manufacturer(s)

1. APC
2. Eaton
3. Leviton
4. Chattsworth
5. SurgeX
6. No Exceptions

### 2.02 POWER DISTRIBUTION UNITS

A. Power Distribution Unit

1. The power distribution unit shall be equipped with a minimum of eight (8) 3-prong, 120 VAC outlets, and 8' cord.

2. The power distribution unit shall be equipped with surge protection with a 20 Amp current limit.
3. The power distribution unit shall be equipped with a bracket that enables it to be mounted on a 19" rack, cabinet, or wall mount bracket without modification.
4. Match PDU plug type to UPS output plugs.

PART 3 - EXECUTION

3.01 POWER DISTRIBUTION UNITS

A. Power distribution units shall be installed as per the requirements specified by the manufacturer's installation guidelines.

B. See Drawings for installation location on rack(s)/cabinet(s).

3.02 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION 271126

# SECTION 271513 - COMMUNICATIONS COPPER HORIZONTAL CABLING

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Copper Horizontal Cabling.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

### 1.02 SUBMITTALS

A. Provide product data from manufacturer's specifications.

### 1.03 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

## PART 2 - PRODUCTS

### 2.01 APPROVED PRODUCTS

A. Approved Horizontal Copper Cable Manufacturer(s)
1. Belden.
2. Berk-Tek.
3. CommScope.
4. General Cable.
5. Leviton.
6. Ortronics (Legrand).
7. Windy City Wire
8. No Exceptions

### 2.02 HORIZONTAL COPPER CABLE

A. 100 OHM Category 6 Balanced Twisted Pair Cable

1. The horizontal balanced twisted pair cable shall meet or exceed the Category 6 transmission characteristics per issue of ANSI/TIA-568 with all addendums and capable of preforming capable of performing to a minimum of 250 MHz.

2. Cable jacket shall be CMR or CMP rated (according to the space it occupies). Cable installed in slab or in exterior conduit shall be OSP reated.
3. Jacket color shall be:
   a. Blue for voice/data
   b. Yellow for wireless access points
   c. Purple for security / intercom
   d. Green for A/V

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS FOR HORIZONTAL CABLES

A. Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.

B. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.

C. Maintain manufacturer's twisting of wire pairs to termination point. Do not attempt to restore, modify, or add to manufacturer's twisting of cable. Do not untwist more than 1/2 inch of the stripped cable

D. A plastic or nylon pull cord with a minimum test rating of 90 Kg (200 lb.) shall be co-installed with all cable installed in any conduit.

E. Cable raceways shall not be filled greater than the ANSI/TIA-569-E maximum fill for the particular raceway type.

F. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.

G. Riser rated cable shall be installed in metallic conduit when installed in a plenum space.

H. Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.

I. The cable's minimum bend radius and maximum pulling tension shall not be exceeded. Refer to manufacturer's requirements.

J. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60 inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

K. Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.

Dress cable to final location, remove sheath to point allowing splaying of conductors, and terminate. Make each termination uniform and precise. Hook and loop cable straps shall be

used for bundling and dressing all cabling. No nylon zip ties shall be used for cable bundling or attachment.

L. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

M. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the Contractor shall install appropriate carriers to support the cabling.

N. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor prior to final acceptance at no cost to the Owner.

O. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA-568-with all addendums document, manufacturer's recommendations and best industry practices.

P. Leave a minimum of 12" of slack for twisted pair cables at the outlet. Cables shall be coiled in the in-wall box, surface-mount box or modular furniture raceway if adequate space is present to house the cable coil without exceeding the manufacturers bend radius. In hollow-wall installations where box-eliminators are used, excess wire can be stored in the wall. Excess slack shall be loosely coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

Q. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.

R. Cables shall be neatly bundled and dressed to their respective termination device. Each terminating device shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

S. Each cable shall be clearly labeled on the cable jacket behind the termination device at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.02 SEPARATION FROM EMI SOURCES

A. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.

B. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
1. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches
2. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches
3. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches

C. Separation between open communications cables or cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
   1. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches
   2. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches
   3. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches

D. Separation between open communications cables or cables in grounded metallic raceways, power lines, and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
   1. Electrical Equipment Rating Less Than 2 kVA: No requirement
   2. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches
   3. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches

E. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).

F. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.03 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

3.04 FIRE STOPPING

A. Refer to Section 27 05 10 – Firestopping for Comm Systems for firestopping information.

END OF SECTION 271513

# SECTION 271543 - COMMUNICATIONS FACEPLATES AND CONNECTORS

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Faceplates and Connectors.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

### 1.02 SUBMITTALS

A. Provide product data from manufacturer's specifications.

### 1.03 WORK INCLUDED

A. The work included under this Specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

## PART 2 - PRODUCTS

### 2.01 APPROVED PRODUCTS

A. Approved Copper Connectivity Manufacturer(s)

1. Berk-Tek
2. CommScope
3. Panduit
4. Hubbell
5. Leviton
6. Siemon
7. Hubbell
8. Connector shall match cable manufacturer when possible.
9. No Exceptions

B. Approved Faceplate Manufacturer(s)

1. Berk-Tek
2. CommScope
3. Panduit
4. Hubbell
5. Legrand
6. Leviton

7. Siemon
8. Hubbell
9. Approved electrical faceplate manufacturer shall supersede above manufacturers, when faceplate option does not exist from electrical faceplate manufacturer selected style shall match as close as possible.
10. No Exceptions

C. Approved Surface Mount Box manufacturer(s)

1. Berk-Tek
2. CommScope
3. Panduit
4. Hubbell
5. Legrand
6. Leviton
7. Siemon
8. Hubbell
9. Approved electrical surface mount box manufacturer shall supersede above manufacturers, when box option does not exist from electrical faceplate manufacturer selected style shall match as close as possible.
10. No Exceptions

2.02 COPPER CONNECTIVITY

A. Voice/Data Jacks

1. Category 6, 8-Position, 8-Contact (8P8C) Modular Jack
   a. The connector module shall meet or exceed the Category 6 performance criteria per ANSI/TIA-568-C.2.
   b. The eight-position connector module shall accommodate six-position modular plug modular cords without damage to either the cord or the module.
   c. The connector module shall be designed for use at the work area (WA), communications room (TR) and/or equipment room (ER) without modification.
   d. The connector module shall be available and wired in the T568B wiring configuration.
   e. The connector module shall have an insulation displacement connection featuring insulation slicing of 22 to 24 AWG plastic-insulated solid copper conductors forming a gas-tight connection.
   f. Icons shall be used if offered from the manufacturer.
   g. Jack/Icon colors shall be:
      Blue for data/voice

B. COAXIAL CONNECTORS
1. Connectors shall be solderless, 75-Ohm impedance and be designed for the specific type of cable used.

2. Series-6 connectors shall be one piece. Series-11 connectors shall use the cable's center conductor as the connector's center pin.

3. All Series-6 and Series-11 connections shall be made with compression-type connectors.

4. Screw-on connectors are not acceptable.

5. The coaxial adapter module that occupies the faceplate shall be a 75-ohm, F-type connector.

2.03 FACEPLATES

A. Faceplates

1. It shall be possible to install the connector modules in wall-mounted single- and dual-gang electrical boxes, utility poles and modular furniture (cubicle) access points using manufacturer-supplied faceplates and/or adapters.
2. The faceplate housing the connector modules shall have the option of being mounted on adapter boxes for surface mount installation.
3. The faceplate housing the connector modules shall have a labeling capability using built-in labeling windows, to facilitate outlet identification and ease network management.
4. The faceplate housing the connector modules shall provide flexibility in configuring multimedia workstation outlets that respond to present or future network needs such as audio, video, coaxial and optical fiber applications.
5. Color shall be same as electrical faceplates.

2.04 SURFACE MOUNT BOXES

A. The surface mount box shall accommodate connections of any type, UTP, optical fiber or coax.

B. The surface mount box shall have internal storage space for slack cabling and a built-in spool for controlling cable bend radius.

C. Color shall be same as electrical faceplates.

PART 3 - EXECUTION

3.01 COPPER CONNECTIVITY

A. 8-position, 8-contact (8P8C) modular jacks shall be installed in accordance with manufacturer's recommendations and installation guides, and best industry practices.

B. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).

3.02 FACEPLATES

A. Blank inserts shall be installed where ports are not used.

B. The same orientation and positioning of jacks and connectors shall be utilized through out the installation.

C. Faceplates shall be installed straight and level.

D. Faceplates shall be installed at the same heights as electrical faceplates.

3.03 SURFACE MOUNT BOXES

A. Blank inserts shall be installed where ports are not used.

B. The same orientation and positioning of jacks and connectors shall be utilized through out the installation.

C. Surface mount boxes shall be installed straight and level.

D. Surface mount shall be installed at heights as electrical receptacles.

3.04 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION 271543

# SECTION 271619 - COMMUNICATIONS PATCH CORDS

## PART 1 - GENERAL

### 1.01 GENERAL REQUIREMENTS

A. Applicable requirements of Division 27 - Communications shall be considered a part of this section and shall have the same force as if printed herein full.

B. This document describes the products and execution requirements relating to Communications Patch Cords.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

### 1.02 SUBMITTALS

A. Provide product data from manufacturer's specifications.

### 1.03 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

## PART 2 - PRODUCTS

### 2.01 APPROVED PRODUCTS

A. Approved Copper Patch Cord Manufacturer(s)

1. Berk-Tek
2. Belden
3. CommScope
4. Siemon
5. Legrand
6. Panduit
7. No Exceptions

B. Approved Copper Fiber Cord Manufacturer(s)

1. Berk-Tek
2. Corning
3. Commscope
4. AFL
5. OCC
6. Siemon
7. Fiber patch cord manufacturer shall be the same manufacturer furnishing the backbone fiber.

8. No Exceptions

2.02 COPPER PATCH CORDS

A. Category 6 Patch Cords

1. The Category 6 patch cord shall be 4-pair, with 24 AWG solid or stranded copper conductors and 8-position modular plug.
2. The Category 6 modular cord cable shall be UL Listed as Type CMR.
3. The Category 6 patch cord shall meet or exceed the requirements of ANSI/TIA-568-C.2.
4. Lengths shall be 3', 5', 7' and/or 10' as required by the application.
   a. The Category 6 patch cord color for voice shall be: Gray
   b. The Category 6 patch cord color for data shall be: Blue
   c. The Category 6 patch cord color for security cameras or other security devices shall be: Purple
   d. The Category 6 patch cord color for wireless access points shall be: Yellow
   e. The Category 6 patch cord color for A/V equipment shall be green

2.03 FIBER PATCH CORDS

1. All patch cord shall be factory terminated.
2. Patch cords shall be LC unless otherwise specified.
3. Complies with individual characteristics established in TIA-568-C including all addendums for fiber optic patch cable performance specification.
4. Lengths shall be 3', 5', 7' and/or 10' as required by the application.
5. Match performance characteristics of installed fiber optic backbone.

PART 3 - EXECUTION

3.01 COPPER PATCH CORDS

A. Copper patch cords shall be installed as per the requirements specified by the manufacturer's installation guidelines.

3.02 FIBER PATCH CORDS

A. Fiber patch cords shall be installed as per the requirements specified by the manufacturer's installation guidelines.

3.03 IDENTIFICATION

A. Refer to Section 27 05 53 - Identification for Communications Systems for labeling details.

END OF SECTION 271619

# SECTION 283000 - ELECTRONIC SECURITY SYSTEMS (PROVIDED BY OWNER)

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS:

A. Contract drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section and shall be considered a part of this section and shall have the same force as if specified herein full.

### 1.02 DESCRIPTION:

A. The Electronic Security System (intrusion alarm system) will consist of an alarm control panel, control keypad and motion detectors The alarm control panel shall include communication devices to allow transmission of alarm signals to UL Listed Central Station. There shall be a digital dialer that utilizes voice grade copper phone lines to transmit alarms signals to a UL List Central Station. Monitoring by a UL Listed Central Station is required. The supply and installation of the alarm control panel, keypads, motion detectors, alarm signal transmission devices and method of alarm signal transmission (such as phone line or cellular account) will be the responsibility of the Security Construction Professional.

### 1.03 QUALITY ASSURANCE:

A. Industry Referenced Standards. The following specifications and standards are incorporated into and become a part of this Specification by reference.
   1. NFPA 70 National Electric Code
   2. UL 50 Enclosures for Electrical Equipment

### 1.04 INSTALLER'S QUALIFICATIONS:

A. Firm with at least 3 years of successful application, installation, and testing experience on the specified systems and equipment. All supervisors and installers assigned to the installation of this system or any of its components shall have factory certification from each equipment manufacturer that they are qualified to install and test the provided products. General electric trade staff shall not be used for the installation of the security system and associated hardware. All installers assigned to the installation of this system or any of its components shall have a minimum of 3 years experience in the installation of the specified equipment.

B. Prior to beginning work, the Construction Professional shall submit a complete list of all employees that will be assigned to the project and that will work at the job site. This list shall be maintained and update continuously during all phases of construction.

C. The responsibilities of the Construction Professional shall include but not be limited to the following:
   1. Installation of all intrusion alarm system and associated equipment as documented in the drawings and specifications.
   2. Coordination of all intrusion alarm system and associated equipment (including coordination required with other trades).
   3. Conduit and wire for all intrusion alarm system and associated equipment.
   4. Wiring termination for all intrusion alarm system and associated equipment.
   5. Testing and check-out of all intrusion alarm system and associated equipment.
   6. Training for all intrusion alarm system and associated equipment.
   7. Warranty for all intrusion alarm system and associated equipment.
   8. As-Built drawings for the complete intrusion alarm system.
   9. One year (12 months of monitoring provided by a UL Listed Central Station.

1.05 SUBMITTALS

A. Product data for each component.

B. Shop Drawings: Prior to proceeding with the work: Provide detailed equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location of each field connection, and a complete schedule of all equipment and materials with associated manufacturers cuts sheets which are to be used.
   1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Identify terminals to facilitate installation, operation, and maintenance. Include a single-line diagram showing cabling interconnection of components and levels throughout system and impedances.
   2. Artwork drawings and lists indicating proposed nameplate nomenclature and arrangements for control panels and plug panels prior to fabrication reflecting equipment used.
   3. Each drawing shall have a descriptive title and all sub-parts of each drawing shall be labeled. All drawings shall have the name and locations of the project, Systems Construction Professional's name in the title block.
   4. Details and descriptions of any other aspect of the system, which must differ from the contract documents due to field conditions or equipment, furnished.

C. FCC Approval: The system shall be approved for direct interconnection to the telephone utility under Part 68 of FCC rules and regulations. Systems, which are not FCC approved or utilize an intermediary device for connection, will not be considered. Provide the FCC registration number of the system being proposed as part of the submittal process.

D. Product Certificates: Signed by manufacturers of equipment certifying that products furnished comply with specified requirements.

E. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.

F. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements.

G. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Include record of final matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.

H. Maintenance Data: For equipment to be included in maintenance manuals specified in Division 1.
   1. Record of Owners equipment-programming option decisions.
   2. All instructions necessary for proper operation and manufacturer's instructions.
   3. "Proof of Performance" information.
   4. Manufacturer's maintenance information.
   5. Copies of non-proprietary computer programs and system set up disks documenting all programmable features of the installed system.

I. Record Drawings: Prior to final acceptance, provide three (3) complete sets of drawings indicating all cable numbers and construction details in accordance with the actual system installation. Revise all shop drawings to represent actual installation conditions. These Record Drawings will be used during "Final Acceptance Testing".

1.6 SYSTEM TRAINING:

A. Submit the following information describing the training programs and system trainers as outlined in paragraph 1.6 of this specification and in accordance with Division 1 specifications.
   1. Include with the submittal a preliminary staff development training program in outline form for review and approval by the Design Professional.
   2. Include with the submittal a current copy of the trainer's certification from the manufacturer that certifies and identifies the trainer(s) who are eligible to provide training and support for the project.
   3. Include with the submittal a current copy of trainer's need's assessment form which will be reviewed with the Design Professional for the system's preliminary system programming and configuration.
   4. Include with the submittal copies of all documentation used to identify for the owner those participants attending and completing the training programs.

1.7 DRAWINGS

A. The Drawings indicate the arrangement of Security equipment. Conditions indicated on architectural drawings shall govern for this work. Coordinate installation of equipment with other trades. Coordinate installation of recessed equipment with concealed ductwork and piping, and wall thickness.

B. All raceways required for intrusion alarm system are not shown on the Drawings. Raceways that are shown are minimum sizes and quantities. Construction Professional shall provide all additional quantities, routing, and sizes of raceways and pull/junction boxes to meet all codes, manufacturer's recommendations, and Specification requirements.

C. Raceway home runs shall be installed as shown on the Drawings, and as required by the associated equipment manufacturers.

1.8 FINAL CLOSEOUT DOCUMENTS

A. At the time of final inspection, provide complete data on equipment used in this project and all shop drawings in "as built" versions. Materials shall be provided in electronic format.

1.9 ACCEPTABLE MANUFACTURERS

A. The approved alarm control panel manufacturers for this project are Ademco, Honeywell and Bosch.

B. Reference the PRODUCTS Section for approved Manufacturers for other related equipment.

1.10 WARRANTY

A. A copy of the manufacturer's standard statement of warranty proving all equipment provided for the electronic security system is covered with the required five-year warranty shall be included with the project submittal. This statement of warranty shall be provided on the manufacturer's stationary.

B. The Security Construction Professional shall warrant all Division 28 Systems for one year from date of Owner's Acceptance against defects in equipment or workmanship. Failed equipment shall be replaced by the Security Construction Professional at no cost to the owner. Owner's personnel may perform initial trouble investigation but replacement of failed equipment and escalated problem support will be handled by the Security Construction Professional.

C. The warranty period shall not start until the Owner has provided a written Letter of Acceptance. It shall be the Security Construction Professional's responsibility to request and obtain the Letter of Acceptance from the Owner.

D. Once the Security Construction Professional has obtained a Letter of Acceptance from the Owner, the Security Construction Professional must provide a Warranty Letter to the Owner. The Warranty Letter must state the start date of the Warranty, instructions that explain how warranty request are to be made and contact name / phone number for service.

PART 2 – PRODUCTS

2.01 ALARM CONTROL PANEL

A. The control panel shall be UL Listed for Commercial Burglary.

B. The control panel shall be capable of providing 8 partitions.

C. The zones shall include 8 hard-wired zones and be expandable to 128 unique inputs. A combination of hardwired, looped and wireless may be utilized. All

wireless transponders must have constant supervision (constantly poled for communication failure and battery status).

D. Local sounders or sirens shall be provided with the system. Also, alarms shall be communicated to a UL Listed Central Station and indicated on the keypads.

E. Battery backup shall be provided for the Intrusion Alarm System. The battery shall be sized for this burglary application and provide a minimum of 4 hours battery back-up for the Control Panel, keypads, sensors and all field devices connected to the system.

F. The system shall be capable of multiple central station communication formats and providing individual as well as unique alarm signals for each alarm point in the system.

G. The entire alarm system shall be protected by surge protection.

H. System programming shall be nonvolatile and shall not be lost if there is a loss in power.

I. Load calculations must be performed to ensure that maximum output of the Alarm Control Panel's internal power supply has not been exceeded. Should the output of the internal power supply be exceeded due to the number of powered devices connected to and powered by the system, an external power supply must be added. The external power supply must be monitored and supervised for AC power fail, low battery and tamper.

J. The Alarm Control Panel shall allow for the programming of unique User codes for arming and disarming. Each User shall be provided with a unique code that is transmitted and saved (for report purposes) by the Central Station.

2.02 KEYPADS

A. Keypads shall be a 2-line, 32-character English language display for complete zone identification and system status, keypad addressable system control units. The keys shall be located behind a protective door and are continuously backlit. The keypad shall mount directly to a single gang electrical box.

2.03 OUTPUTS

A. The Alarm Control Panel shall provide outputs with a change-of-state for the following:
1. ARMED
2. DIS-ARMED
3. ALARM ACTIVATION

2.04 PARTITIONS / ZONES

A. The panel must allow for multiple partitions.

B. The panel must allow for each detector in the polling loop to be a zone and assigned to a unique partition.

2.05 DETECTORS

A. The Honeywell dual-technology devices are the only approved motion detectors for this project.

B. Dual technology, long range and wide-angle motion detectors shall be provided in the locations as shown on the drawings.

C. The long-range motion detectors shall be Honeywell, model DT-900 series with passive infrared and microwave technology. The long-range motion detectors shall provide a minimum coverage area of 120' x 10' and 90' x 70' (relative to masking be applied or not applied). The long-range motion detector shall include:
1. Digital Fluorescent light fixture filter
2. Self adjusting thresholds and self-test
3. Design for harsh environments
4. Diagnostic LEDs

D. The wide-angle motion detectors shall be Honeywell, model DT-435 series with passive infrared and microwave technology. The wire angle motion detectors shall provide a minimum coverage area of 50' x 40'. The motion detector shall include:
1. Diagnostic LED's

E. The motion detector detection pattern shall be easily adjustable at the time of installation to suit each individual application.

F. Locate the detector as shown on the drawings and so that the likely motion of intruders will cross the detection pattern. The mounting height of all wall mounted detectors shall be no less than 7 ft. Ceiling mounted detectors must be securely mounted with back box or rails in lift out tile ceiling. It shall be the responsibility of the Security Construction Professional to ensure that the motion detector's mounting location provides the optimal detection pattern.

2.06 MONITORING

A. Off-site monitoring by a UL Listed Central Station must be provided for the Intrusion Detection System. Provide one-year monitoring for the system as part of base contract.

B. Provide 1-year (12 months) of monitoring service. Open and closing reports (upon request by New Auburn City School) are required. Test reports are not required as part of the monthly monitoring service.

PART 3 – EXECUTION

3.1 WIRING

A. The Construction Professional shall provide drawings and calculations to insure the wire gauge has been selected per the manufacturer's requirements.

B. Intrusion alarm system wiring shall be installed per manufacturers recommendations to prevent interference with intercom, telephone, and data cabling.

3.2 INSTALLATION

A. The Intrusion Alarm System shall be supplied and installed by a Construction Professional that has been continuously engaged in the sales and installation of Intrusion Alarm Systems for a minimum of five (5) years. The Construction Professional shall provide a complete and operational system and include all power supplies, batteries, panels, and accessories required to have the system meet the required specifications.

B. Installation drawings shall be provided that show detector location, detector zone number, and detector partition number.

C. The Construction Professional shall provide a warranty per the contract terms and conditions.

3.3 TRAINING

A. The Construction Professional shall include in the base Contract all costs required to train owners operating and maintenance personnel in the use and maintenance of systems provided under this section of the Specifications. Training sessions shall be conducted by qualified instructors who are familiar with the equipment and with the system installation. "Quickstart" user guides developed by the Construction Professional shall be presented in these training sessions.

B. Time to be included in base Contracts for specific systems shall be as follows: Electronic Security Systems- 8 hours.

END OF SECTION 283000

# SECTION 283010 -VIDEO SURVEILLANCE SYSTEM (PROVIDED BY OWNER)

## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS

A. Contract drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section and shall be considered a part of this section and shall have the same force as if specified herein full.

### 1.02 DESCRIPTION

A. This section includes furnishing and installing all materials and providing all labor and supervision pertaining to the installation of an IP Based Video Surveillance System.

B. The requirements of the IP Based Video Surveillance System shall include all raceway, cabling, devices, equipment, computer software and hardware required to provide a fully functional system. Provide all labor, materials, equipment, and supervision to install, check out, adjust, and calibrate the total system. Reference contract drawings for complete requirements.

C. The requirements of the IP Based Video Surveillance System shall include all power inserters and connection to electrical panels for power circuits at exterior camera locations for complete and fully operational system.

D. The requirements of the IP Based Video Surveillance System include all programming of the Video Server to record all cameras in Time Lapse and Motion / Alarm record modes. The Video Server shall be programmed to record all cameras in continuous Time Lapse Mode at a minimum frame rate of 5 frames per second (fps) continuous at 1080p resolution. The Video Server shall be programmed to record when activity is detected in the cameras field of view at 30 frames per second and at the full resolution of the camera. During alarm recording mode, cameras are to be recorded at full resolution so that full zoom capabilities are available when viewing archived alarm events. This level of programming has been difficult for most Security Construction Professionals. Obtaining Manufacturer's on-site / phone support and all associated cost are the full responsibility of the Security Construction Professional.

E. The requirements of the IP Based Video Surveillance System include all programming of the Video Server to ensure recorded video from all cameras is stored and archived for 31 days. The Security Construction Professional shall be responsible for sizing the archiver hardware storage capacity based on 31 days of constant recording of all cameras recorded at all times and at 5 fps as well as motion-based recording based on 50% motion, 30 fps and full resolution for 31 days.

F. This division of the Specifications covers the complete IP Based Video Surveillance system as indicated on the Drawings and specified herein. The Security Construction Professional shall provide all labor, materials, equipment, and supervision to install the specified system with the exception of cabling, patch panels, patch

cords, conduit & junction boxes. The installation of all cabling, patch panels & patch cords shall be responsibility of Security Construction Professional. The junction boxes and conduits shall be responsibility of electrical Construction Professional.

G. As part of the scope of this contract, the Security Construction Professional shall install and configure client software on up to three (3) Owner provided workstations. Each workstation shall be able to view all respective cameras.

H. The IP Based Video Surveillance System shall utilize an existing dedicated network. The Security Construction Professional must ensure that all Video surveillance cameras are connected to this network and that all video is routed to the Network Server (for live view and archiving).

I. The Security Construction Professional shall be responsible for coordinating the exact location of the IP Based Video Surveillance System network equipment in data racks provided by the Telecom Construction Professional.

J. A minimum of one (1) portable media with client monitoring software and one (1) Operating Instruction Manual (for the software) must be provided with each Client Workstation software application that is loaded onto Owner provided computer hardware. Additional copies of client monitoring software with loading and operating instructions on portable media must be available upon Owner's request at no charge for the duration of the warranty period.

K. All conflicts between the drawings and specifications shall be brought to the attention of the owner as soon as possible. In general, specification requirements shall take precedence over drawing requirements.

L. As part of the base bid, the Video surveillance management and recording system shall include a network-based Video Recording System.

1.03 QUALITY ASSURANCE

A. Industry Referenced Standards. The following specifications and standards are incorporated into and become a part of this Specification by reference.
   1. NFPA 70 National Electric Code
   2. UL 50 Enclosures for Electrical Equipment
   3. UL 1590
   4. FCC Part 15, Class B
   5. ICEA S-83-596 ICEA Standard for Fiber Optic Premises Distribution Cabling – Current Edition
   6. IEEE802.3at PoE
   7. IEEE802.3af PoE
   8. EN 60950-1
   9. EN 55022 Class B (Emissions)
   10. EN 55024 (Immunity), VCCI

1.04 INSTALLER'S QUALIFICATIONS

A. Firm with at least 5 years of successful application, installation, and testing experience on specified systems and equipment. All supervisors and installers assigned

to the installation of this system or any of its components shall have factory certification from each equipment manufacturer that they are qualified to install and test the provided products. General Electric trade staff shall not be used for the installation of the Video Surveillance System and associated hardware. All installers assigned to the installation of this system or any of its components shall have a minimum of 3 years' experience in the installation of the specified equipment.

B. Security Construction Professional must be a certified installer of the manufacturer of the IP Based Video Surveillance System.

C. The Security Construction Professional must be licensed in the State of Georgia as a Low Voltage Telecommunications (LV-T) or Low Voltage Unrestricted (LV-U) class certification.

D. The responsibilities of the Security Construction Professional shall include but not be limited to the following:
   1. Shop drawings on all IP Based Video Surveillance Systems and equipment.
   2. Installation of all new IP Based Video Surveillance Systems and equipment as documented in the drawings and specifications.
   3. Set up and programming of all alarm event and recording parameters for all cameras (as defined by Owner).
   4. Coordination with Owner to establish at list of common camera names. Then programming of all camera names into all Video Surveillance System displays.
   5. Testing and check-out of all IP Based Video Surveillance systems and equipment.
   6. Training for all IP Based Video Surveillance systems and equipment.
   7. Warranty for all IP Based Video Surveillance systems and equipment.
   8. As-Built drawings, operations, and maintenance for the complete IP Based Video Surveillance System.

E. The responsibilities of the Security Construction Professional shall include but not be limited to the following:
   1. Set up and programming of all motion detection.
   2. Wire and wiring termination for all IP Based Video Surveillance and control systems and equipment.

1.05 SUBMITTALS

A. Product data for each component.

B. Shop Drawings: Prior to proceeding with the work: Provide detailed equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location of each field connection, and a complete schedule of all equipment and materials with associated manufacturers cuts sheets which are to be used.
   1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Identify terminals to facilitate installation, operation, and maintenance. Include a single-line diagram showing cabling interconnection of components and levels throughout system and impedances.

2. Each drawing shall have a descriptive title and all sub-parts of each drawing shall be labeled. All drawings shall have the name and locations of the project, Systems Construction Professional's name in the title block.
3. Details and descriptions of any other aspect of the system, which must differ from the contract documents due to field conditions or equipment, furnished.

C. FCC Approval: The system shall be approved for direct interconnection to the telephone utility under Part 68 of FCC rules and regulations. Systems, which are not FCC approved or utilize an intermediary device for connection, will not be considered. Provide the FCC registration number of the system being proposed as part of the submittal process.

D. Product Certificates: Signed by manufacturers of equipment certifying that products furnished comply with specified requirements.

E. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.

F. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements.

G. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Include record of final matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.

H. Maintenance Data: For equipment to be included in maintenance manuals specified in Division 1.
   a. Record of Owners equipment-programming option decisions.
   b. All instructions necessary for proper operation and manufacturer's instructions.
   c. "Proof of Performance" information.
   d. Manufacturer's maintenance information.
   e. Copies of non-proprietary computer programs and system set up disks documenting all programmable features of the installed system.

I. Record Drawings: Prior to final acceptance, provide three (3) complete sets of drawings indicating all cable numbers and construction details in accordance with the actual system installation. Revise all shop drawings to represent actual installation conditions. These Record Drawings will be used during "Final Acceptance Testing". Confirm with Owner that substitution of electronic copies is acceptable.

J. System Training: Submit the following information describing the training programs and system trainers as outlined in paragraph 1.6 of this specification and in accordance with Division 1 specifications.
   a. Include with the submittal a preliminary staff development training program in outline form for review and approval by the Design Professional.
   b. Include with the submittal a current copy of the trainer's certification from the manufacturer that certifies and identifies the trainer(s) who are eligible to provide training and support for the project.
   c. Include with the submittal a current copy of trainer's need's assessment form which will be reviewed with the Design Professional for the system's preliminary system programming and configuration.

d. Include with the submittal copies of all documentation used to identify for the owner those participants attending and completing the training programs.

K. A copy of the manufacturer's standard statement of warranty proving all equipment provided for the system is covered with the required five-year warranty shall be included with the project submittal. This statement of warranty shall be provided on the manufacturer's stationary.

1.06 DRAWINGS

A. The Drawings indicate the arrangement of IP Based Video Surveillance equipment. Coordinate installation of equipment with the structural, mechanical, and electrical equipment and access thereto.

B. Raceway home runs as shown on the IP Based Video Surveillance System shall be installed as shown on the Drawings, and as required by the associated equipment manufacturers.

C. Revit drawings (floor plans only) in electronic RVT format shall be provided to the Security Construction Professional for the production of shop drawings and As-built drawings. The Security Construction Professional is totally responsible for the conversion, if necessary, of the electronic files to whatever in house CAD program the Security Construction Professional utilizes to generate the as-built drawings.

1.07 ACCEPTABLE MANUFACTURERS

A. Reference products section of specifications for acceptable manufacturers.

1.08 WARRANTY

A. Provide a manufacturer's five-year warranty of the system against defects in material and workmanship. This warranty will cover all electronic equipment associated with the system. If any defects are found within the warranty period, the defective equipment shall be replaced at no cost (equipment only); a one-year warranty shall be provided for labor.

B. A copy of the manufacturer's standard statement of warranty proving all equipment provided for the system is covered with the required five-year warranty shall be included with the project submittal. This statement of warranty shall be provided on the manufacturer's stationary. The standard five-year warranty is an important element in establishing a standard in quality. Manufacturers who circumvent the five-year warranty by offering special "extended warranties" that are not part of their normal published warranty will not be accepted.

C. Construction Professional shall respond, excluding weekends and holidays, within 24 hours to any warranty service calls. If equipment cannot be repaired within 24 hours of service visit, the Construction Professional shall provide "loaner" equipment to the facility at no charge.

D. Make available a service contract offering continuing factory authorized service of the system after the initial warranty period.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Materials or equipment specified by manufacturer's name shall be provided unless approval of other manufacturers is listed in addendum to these Specifications. Any materials or equipment approved in addendum shall function the same as the equipment specified.

2.02 VIDEO SURVEILLANCE CAMERAS

A. All cameras shall be U.L. listed and shall be the standard product of one manufacturer complying with not less than the specifications contained herein. Installation of each camera shall include mounting brackets and/or camera housings fully compatible with the camera provided and as required by IP Based Video Surveillance System camera schedule.

B. All camera installations shall be securely attached to the mounting surface. Use lead shields on solid masonry, toggle bolts for hollow masonry, and machine bolts for steel. All anchoring devices shall be rated to support not less than five times the total equipment weight. All anchor bolts must be a minimum of 2 ½" inches in length. Reference mounting details in contract documents.

C. Indoor /Outdoor Fixed Dome, Wide Dynamic Range, 2 Megapixel Cameras (Type 1):
   1. The camera shall be the Avigilon H5A series vandal resistant, dome style camera.
   2. This camera shall also be available in a comparable outdoor rated version.
   3. All cameras, in this category, shall be equipped with variable focal (3.3mm to 9mm) lenses.

D. Indoor 270 Degree Field-of-View Multisensor, Dome Style, Wide Dynamic Range 15 Megapixel Camera (Type 2)
   1. The camera shall be the Avigilon H4 Multisensor vandal resistant, 270-degree dome style camera, 15 Megapixel (3X5MP).
   2. All cameras, in this category, shall be equipped with a 2.8mm fixed lens.
   3. Provide outdoor dome and cover for exterior locations.

E. Indoor /Outdoor Fixed Dome, Wide Dynamic Range, 6 Megapixel Cameras (Type 3):
   1. The camera shall be the Avigilon H5A series vandal resistant, dome style camera.
   2. This camera shall also be available in a comparable outdoor rated version.
   3. All cameras, in this category, shall be equipped with variable focal (4.9 to 8mm) lenses.

F. Indoor /Outdoor Fixed Dome, Wide Dynamic Range, 4 Megapixel Cameras (Type 4):
   4. The camera shall be the Avigilon H5A series vandal resistant, dome style camera.
   5. This camera shall also be available in a comparable outdoor rated version.
   6. All cameras, in this category, shall be equipped with variable focal (3.3mm to 9mm) lenses.

G. Indoor Fixed Dual Sensor Dome, Wide Dynamic Range, 10 Megapixel Cameras (Type 5):
   1. The camera shall be the Avigilon H5DH Dual Sensor series, dome style camera, 10

Megapixel (2X5MP).

2. All cameras, in this category, shall be equipped with variable focal (3.35 to 7mm) lenses.

H. Indoor /Outdoor Fixed Dome, Wide Dynamic Range, 8 Megapixel Cameras (Type 6):
   7. The camera shall be the Avigilon H5A series vandal resistant, dome style camera.
   8. This camera shall also be available in a comparable outdoor rated version.
   9. All cameras, in this category, shall be equipped with variable focal (4.9mm to 8mm) lenses.

I. It shall be the Security Construction Professional responsibility to ensure that the latest version of firmware, that is compatible with the Video Management System, is down-loaded to all cameras prior to Final Inspection.

J. Interior Mini-Domes: All mini-dome style cameras, installed in lay-in tile ceilings, shall be supported by T-bar Support Kits.

K. Reference camera details and schedule for housing types required.

2.03 VIDEO MANAGEMENT SYSTEM (VMS)

A. GENERAL
   1. Approved VMS Manufacturer(s).
      a. Owner Standard manufacturer to be determined. It is It is expected that basis of design will be Avigilon or comparable.
   2. The Video Management System (VMS) software shall be used to view live and recorded video from IP devices connected to local and wide area networks. The VMS software shall have a client/server-based architecture that can be configured as a standalone VMS system with the client software running on the server hardware and/or the client running on any network-connected TCP/IP workstation. Multiple client workstations shall be capable of simultaneously viewing live and/or recorded video from one or more servers. Multiple servers shall also be able to simultaneously provide live and/or recorded video to one or more workstations.
   3. The VMS shall not charge for the number of concurrent clients.
   4. Recording of all videos transmitted to the VMS shall be continuous, uninterrupted, and unattended.
   5. The VMS system shall offer the capability of video motion detection recording, such that video is recorded when the motion is detected in the camera's field-of-view or within a pre-programmed region of interest of the camera's view. Video prior to and after the detection of the motion shall also be stored. The exact amount of video stored prior to and after the event shall be determined by the OWNER.
   6. The VMS software shall have an open architecture supporting IP cameras and encoders from multiple manufacturers providing best-of-breed solutions ranging from low-cost, entry-level features to high-resolution, megapixel features.
   7. The VMS client software shall be able to view live video and audio, recorded video and audio, and be able to configure the complete system all from a single application.
   8. The VMS shall always continue to record video and audio during the administration and configuration of any feature.

9. The VMS client software shall have the same functionality when connected remotely as it does when it is run locally on the same computer as the server software.
10. The VMS client software shall add and remove features based on the permissions of the user and the licensed functionality.
11. The VMS shall also allow an authorized user to view video through a web client interface. The web client interface shall allow authorized users to view live video, view recorded video, control pan-tilt zoom (PTZ) cameras and activate triggers. The web client interface shall allow connections to multiple VMS servers simultaneously.
12. The VMS server software shall record and retrieve video, audio and alarm data and provide it to the VMS clients upon request.
13. The VMS software shall provide at no additional charge a purpose-built mobile application capable of viewing multiple simultaneous live video streams and playing a recorded video stream. Application shall be provided for both iOS and Android operating systems (including Kindle Fire).
14. The VMS shall license the total number of cameras on the system. This license shall be based on the MAC address of a single network card that is present on the system. The VMS shall only require that this network card be enabled and does not require that data is actually sent through it.
15. The VMS shall not require the manufacturer to be contacted when a camera fails.
16. The VMS server software shall run as a service. The VMS shall not require any application to be running in order to operate.
17. The VMS shall allow the use of maps. The maps will be accessible to users with the appropriate permission levels and display video sources and their status.

B. WEB CLIENT

1. The Web Client will be a thin client, using either an active-x control or an MJPEG streaming method.
2. The Web Client shall support IE, Firefox, Safari, Chrome, and Opera.
3. Licensing will not be required.
4. Users will not be able to change any settings within the server via the thin client.
5. Users will be able to select layouts for live viewing, or individual cameras or groups of cameras.
6. Users will be able to access recorded video and download recorded video from the system.
7. Users will be able to use the motion log to find recorded video.
8. The Web Client shall support the use of facility maps and support the use of custom layouts.
9. The Web client shall allow remote access for iPhone, Blackberry, Windows Mobile, and Android mobile phones without the installation of an app.

C. MONITOR STATION

1. The monitor station will be a thick client for viewing live and recorded video, along with handling administrative tasks.
2. The software shall not require a client license to operate.
3. The thick client will support an encrypted XML file for storing settings. The file can be set up to be shared between many clients, allowing the administrator to update all clients with a single file push.

4. Clients will be able to us Active Directory to authenticate users.
5. The Monitor Station will display the servers it is connected to along with the server's cameras in a tree view on the left-hand side.
    a. The tree view will allow the user to see the status of the servers that the instance of the monitor station is aware of.
    b. The tree view will also include access to custom layouts, facility maps and action buttons.
    c. There will be an option to hide the tree on start-up of the monitor station.
    d. The user shall be able search for cameras using a searchable box on the left-hand tree.
6. Live view will allow views of 1, 4, 8, 9, 10, 13, 16, 25 and 36 cameras. A widescreen option for 18 and 24 cameras will also be available.
    a. Layouts will be selectable via icon or keyboard function keys.
    b. Layouts will not be limited to cameras from a single server.
    c. Users will be able to get any combinations of layouts to cycle through on the main screen.
    d. Users will be able to designate cameras within a layout to be able to cycle between multiple cameras from multiple servers.
    e. Layouts shall be able to be put into groups.
7. If motion is detected on a camera, then the software, then the camera shall have a red pulse around the edge of the window.
8. Live view will allow cameras to be dragged and dropped onto the live view from the left-hand tree. Cameras can be duplicated in a view.
9. Users will be able to invoke a digital zoom by drawing a box. After invoking the digital zoom, the Monitor Station shall support the use of picture in picture within the zoomed image.
10. Digitally zoomed areas will be treated as a digital PTZ.
11. PTZ Presets shall be listed in a drop-down menu in the camera window.
12. Users shall be able to move the PTZ movements simply by clicking on the image or by using the scroll wheel.
13. Live view shall allow the user to de-warp the video from panoramic lenses and cameras.
14. Right clicking on a camera in live view will have the following behaviors:
    a. Right clicking on a camera within live view will allow the user to be able to review the recently recorded video for that camera.
    b. Right clicking on a camera within live view will also allow access to the properties dialog box for that camera.
    c. Right clicking on a camera will bring up the option to save a still image of the live view.
    d. Live audio will be able to be accessed by right clicking on a camera in the live view.
    e. Allowing access to recorded video.

15. Recorded video will be able to be accessed by right clicking the live view, expanding the camera in the tree view, or by opening the media player via the pull-down menus.

16. The Media player shall support the following functionality:

a. The ability to fast forward and rewind video at up to 16x normal playback speed.
b. The ability to generate clips of recorded video. The clips can be defined by either frame numbers or by using slider bars visible on the player.
c. The ability to save video directly to a CD or to a local hard drive or network share.
d. If motion detection and logging are enabled, a timeline of video will be displayed. The user will be able to zoom in on the timeline and use it to select where video will start playing from.
e. Users will have access to a motion log which will show motion events and how long they occurred for. Clicking on the entry will start the video from the appropriate spot.
f. The player will support digital zoom.
g. The player will have the option to allow an object search. The user will be able to define an area and seek out changes in the image within that area.
h. The User shall have the option of forcing export of video as the native codec of the camera or MJPEG.
i. User will have the option to burn time-date into the video as a clip.
j. Users will have the option to create a time index file for clips.
k. Users will be able to grab a snapshot of the recorded video.

17. Synchronized playback will allow for cameras to simply be dragged and dropped into the player. The Synchronized player shall allow for the exporting of the view of up to four cameras a single video file.
18. The Monitor Station will be able to display logging information, such as changes to the server, lost camera signals, who exported recorded video, when did users log-on/off and other errors. This functionality will be limited to administrative users. The log will be exportable as txt or to the Windows clipboard.
19. The Monitor Station shall also provide real time status updates for server status and camera status, including the CPU usage, disk usage, bandwidth usage, licensing and number and names of users who are logged in.
20. The system will support an Alarm Log to make it easier to find DIO based events.
21. Facility maps will be available in the software for viewing.
    a. When the user hovers over a camera in the facility map it will display the camera in a window off the side of the map.
    b. While a camera is displayed it will allow access to recorded video from that camera as well as the live stream.
    c. Cameras will display where they are pointed.
    d. Embedded layouts will change the layout of the Monitor station if they are clicked on.
    e. Embedded Facility maps will cause the current map to change to the embedded map if clicked on.
    f. The user will have the option of importing and placing doors from supported access control partners on the map. This shall allow them to see

badge events as well as alarm events. It shall also support the ability to lock and unlock doors from the map.

g. Panic button events from the Audio Enhancement systems will be visible on the map as well.

22. The Monitor Station will support the Axis Joystick as well as standard USB joysticks.
23. The software shall support the ability to open a live window that can be moved around. This window will be able to access the view of any camera or layout the user has access to.
24. The user will be able to enable or disable the following settings:
    a. Server name in the live view.
    b. Camera Name in the live view.
    c. Audio notification on motion.
    d. Forcing aspect ratio.
    e. Use Direct Show for display.
    f. Double clicking to change the server layout.
    g. Double clicking expands the camera.
    h. Allowing multiple live windows.
    i. Block live windows from popping up.
    j. Live window always on top.
    k. The speed in which layouts cycle.
    l. Hiding left tree on start up.
    m. Launching Facility maps on start up.
25. Users with Administrator privileges will be able to configure the server and camera settings. Users will also be able to test SMTP settings and database settings.
    a. Users will be able to configure the framerate of the camera, including the option to have the server record continuously at 1 fps with the option to go to the camera's maximum framerate on motion detection.
    b. Users will be able to select various time-lapse options for the camera.
    c. Users will be able to select the camera stream type.
    d. Users will be able to select camera or server-side motion detection.
26. Users will be able to access a graphic representation of what the server's motion detection settings are picking up.
27. Users will be able to configure user settings as well as layout settings from within the thick client.
28. The software shall allow users to send video or messages to other users in the form of a popup window.
29. The Monitor Station will allow users to send video to other users, allowing for remote live pop ups of video of important events.
30. The Monitor Station will support Layout touring. Selecting a layout will cycle through a list of cameras.

D. IP VIDEO SERVER

1. The Server shall be designed to run on a Windows platform, supporting both Desktop and Server class operating systems including Windows7.
2. Server shall run as a Window's Service. This service shall run as part of the local service account. This service shall be running as long as the system is

booted and has started Windows. It shall not require the user to be logged in.

3. The Server will store settings in SQL Express and shall not require a full MS-SQL license.
4. The Server shall have an option for a 32-bit binary and a true 64-bit binary. In a 64-bit OS, the server shall run as a native 64-bit application, not merely a 32-bit application.
5. The service shall connect to the camera and handle streaming to the server. It shall not require each client to connect to individual cameras.
6. This service shall allow the cameras to be placed on one network and the clients on a separate network using a different IP range.
7. The software shall support the ONVIF standard.
8. The software shall support Megapixel virtual cameras within a single camera license.
9. The server shall only require two ports for streaming video as well as handling any setting changes or commands from the client software.
10. The Server shall record the video streams from different cameras.
    a. The service shall handle transcoding of the camera streams if the cameras are MJPEG based. The video shall be re-encoded to WMV to reduce storage needs and to reduce the impact of streams to clients on the server.
    b. For MPEG-4 based cameras, the video shall be stored in the native codec of the server.
    c. For H.264 based cameras the video shall be stored in the native codec of the server.
    d. Each camera will have the option to be able to be stored in different locations (i.e., One locally, another on a NAS, a third on a different network share)
    e. Streaming from server to client shall support H.264.
11. The Server shall support H.264, MPEG-4, MJPEG and MXPEG based cameras.
12. The Server shall support motion detection at the camera and at the software levels.
13. The Server shall provide graphic examples of what it determines as motion to thick clients if the thick client requests it.
    a. The software shall display the motion detection as an outline around the area moving.
    b. The software shall provide a bar showing the total percentage of change. This bar shall have a slider on it to allow the user to quickly set motion detection.
14. The Server shall allow for multiple zones to be set within an image that support differing motion detection values within a cameras field of view.
    a. There shall be no limit on the total number of zones allowed, either on a per camera or per server basis.
    b. Zones should allow the ability to ignore motion within an area.
    c. The user shall have the ability to move the zones after the fact.
    d. Motion zones should be able to be tied into a rules engine to allow the software to use them as triggers for events.

15. The Server shall support the use of imported maps to show camera placement. These maps will be in .jpg, .gif, or .bmp formats as determined by the user.
    a. Hovering over a camera on a map shall cause it to be displayed in a window on the side.
    b. When the camera is displayed on the side, the option to review recently recorded video will be available to them.
    c. The user shall be able to embed layouts onto the facility map. Clicking on the layout shall change the display of the client software.
    d. Alarms from DIOs shall be able to be embedded as well.
    e. Audio sources shall also be an option.
    f. Other facility maps shall also be an option to embed. Clicking on a different embedded map shall bring up that map.
    g. Doors from certain access control systems can be imported and displayed. Hovering over the door shall display the last badge used to badge in, a live view of the camera associated with the door. The user from this pop up shall be able to see badge events and alarm events along with the associated video.
16. The Server shall not require the administrator to contact the manufacturer to replace a camera.
17. The Server shall support reporting to a diagnostic tool.
    a. The server will report the number of active cameras.
    b. The server shall report active cameras offline.
    c. The version of the server.
    d. The amount of disk space left.
    e. The recording status of the server.
18. The server shall support pre-motion and post motion recording.
19. The server shall support customizable layouts. The layouts will allow for blank spaces within the layout.
20. The server shall support an unlimited number of users.
    a. Users can be drawn from either an Active Directory server, Novell eDirectory or entered manually.
    b. There will be five different levels of user.
    c. Users can be members of a group with settings set for the group. Individual user settings can override the group settings.
    d. Permissions can be set for live viewing, access to recorded video, control of PTZ cameras, access to audio, the ability to export video, custom layouts, facility maps and rules. Permissions can be defined on a per camera basis.
    e. The server shall support the option of having the users limited to being signed into a single location.
21. The server will include a diagnostic version with limited interface, to allow for testing of the server.
22. The server shall support an optional secondary server with fall-over capacity.
23. A rules engine shall be included to allow the server to handle more complex tasks.
    a. Triggers will include:

1. Dry contacts (DIO)
2. Motion detection of a camera stream.
3. Scheduled events. Events can be scheduled on daily, weekly, or monthly basis. Individual events can be handled as well.
4. An alert button for the user interaction in the monitor station.
5. Inputs sent programmatically via appropriate APIs.
6. Access control events from supported Access Control Vendors.

b. Actions will include:

1. Logging the event.
2. Opening or closing a dry contact.
3. Sending an e-mail with a custom text message tied to the trigger. Multiple texts will be allowed for different triggers.
4. Sending an e-mail with an .avi clip from a selected camera.
5. Sending an e-mail with a .jpg of a selected event from a camera.
6. Opening a live window for a user who is viewing.
7. Move a PTZ to a certain preset location.
8. Force recording.
9. Force recording with audio.
10. Instant Replay
11. Sending video to a Network Decoder
12. Switching single camera or layout views.
13. Message Instruction
14. Moving, copying, or deleting of files.
15. Execute a program or batch file.
16. Send an ASCII string to a TCP port.

24. The server shall support time out functionality.
25. A universal RTSP option shall exist for adding cameras if they are not currently supported through native APIs.
26. Full PTZ functionality shall be supported.
27. Dewarping of Panoramic shall be supported for the following manufacturers:
    a. Sentry 360
    b. Vivotek
    c. Panasonic
    d. Axis
    e. Immervision
    f. Mobotix
    g. ACTi
    h. Advidia
28. The server will only stream video to clients that the clients request.
29. If live video is paused, then the server shall stop streaming video to the clients to conserve bandwidth.
30. The server shall support integration with various access control platforms, including:
    a. S2
    b. Lenel
    c. Monitorcast
31. The server shall have support for the Audio Enhancement's panic button functionality.

32. The server shall have the ability to handle a total throughput of 600 mbit/s total throughput for the server for camera connections.

2.04 ETHERNET NETWORK SWITCHES

A. All network switches shall be as selected by the Owner's IT Support Group and provided by Security Construction Professional.

B. Minimum requirements for Gigabyte PoE Ethernet Network Switches are as follows:
   1. Ethernet switches shall be UL listed and shall meet with regulatory agency approval for Safety Certification, Electromagnetic Emission Certification, and Network Equipment-Building System (NEBS) guidelines.
   2. All switches to be capable of mounting in standard 19" equipment racks.
   3. All switches must support Quality of Service (QOS) and shall support IEEE 802.1p COS and Internet Protocol (IP) Differentiated Services Code Point (DSCP) services as a minimum.
   4. All switches shall support rate-limiting based on source/destination IP address, source/destination MAC address, or Layer 4 TCP/UDP information.
   5. All switches shall provide Power over Ethernet and support the following standards: IEEE 802.3ad, IEEE 802.1Q, 802.1D, 802.1X, and 802.3af.

C. Acceptable manufacturers shall include Cisco Systems and Hewlett-Packard.

2.05 PATCH PANELS (PROVIDED BY SECURITY CONSTRUCTION PROFESSIONAL)

A. All patch panels shall be provided by security Construction Professional except where noted on drawings that patch panels will be provided as part of the structured cabling system. See plans for quantity and size of each patch panel. Provide additional patch panels as required to land all cables as necessary.

2.06 PoE INSERTERS (MIDSPAN)

A. Minimum configuration shall be:
   1. 10/100/1000 Mbps pass through rate
   2. Each device / port shall meet IEEE PoE or upcoming IEEE PoH standards

B. Minimum number of ports shall be 12. See Contract drawings to verify the exact quantity of ports required at each facility. Note that spare ports are required for future expansion.

C. PoE power options shall be 15.4, 30, 36 or 72 watts.

D. Acceptable manufacturers shall be PowerDsine and Transition Networks. NO SUBSTITUTIONS ALLOWED.

E. Acceptable models are the 9000 and 9500 series.

2.07 PoE EXTENDERS

A. Minimum configuration shall be:
   1. 10/100/1000 pass through rate
   2. Each device / port shall meet EEPoE standards
   3. Each port extends data and PoE connections 200 meters

B. Acceptable manufacturers shall be PowerDsine, Veracity, and Transition Networks. NO SUBSTITUTIONS ALLOWED.

2.08 COPPER WIRING REQUIREMENTS (Provided by Security Construction Professional, except for locations as noted on drawings where cables are provided by the Voice/Data Construction Professional)

A. CAT 6 cable between IP Camera location and the closest MDF / IDF shall be provided. The following requirements shall be for any miscellaneous cables needed to make the IP Based Video Surveillance System fully operational:

   1. Indoor: Data cables shall be 100 Ohm, un-shielded twisted pair (UTP), 23 AWG, plenum rated with solid copper conductors. Cables shall exceed ANSI/TIA/EIA-568-B.2 Category 6 requirements and the spool shall be labeled as such. Cables shall be tested to 250 MHz. Cables shall be UL or ETL verified to exceed Category 6 requirements and cable jacket shall be labeled to indicate verification. Cable color shall be yellow.

   2. Outdoor Rated: Data cables shall be 100 Ohm, un-shielded twisted pair (UTP), 23 AWG, outdoor rated with solid copper conductors with water blocking properties. Cables shall exceed ANSI/TIA/EIA-568-B.2

      Category 6 requirements and the spool shall be labeled as such. Cables shall be tested to 250 MHz. Cables shall be UL or ETL verified to exceed Category 6 requirements and cable jacket shall be labeled to indicate verification. Cable color shall be black.

2.09 CATEGORY 6 CONNECTIVITY (Provided by Security Construction Professional)

A. Termination jacks for CAT 6 cable between IP Camera location and the closest MDF / IDF shall be provided. The following requirements shall be for any miscellaneous connectors needed to make the IP Based Video Surveillance System fully operational:
   1. Each jack shall be power sum rated, with a power sum NEXT performance equal to or better than the ANSI/TIA/EIA-568-B.2-1 Category 6 pair-to-pair NEXT performance specifications.
   2. Each jack shall be T568B wiring configuration.

2.10 SURFACE MOUNT BOXES "BISCUIT" (Provided by Security Construction Professional)

A. Surface mount boxes shall house two jacks.

B. Bases shall be installed with two screws to building structure.

C. Boxes shall be compatible with connectivity.
D. Blanks shall be provided for each unused port.

2.11 CATEGORY 6 PATCH CORDS (Provided by Security Construction Professional)

A. Category 6 patch cords shall be provided by security Construction Professional. Coordinate length of each patch cord with Security Construction Professional.

2.12 WIRING DUCT (Provided by Electrical Construction Professional)

A. Construction Professional shall provide surface mount raceway for cables installed below ceiling.

B. Wiring duct shall be typical to Hubbell PS3 series.
C. Wiring duct shall be painted to match existing wall color.

2.13 UNINTERRUPTIBLE POWER SUPPLY (UPS)

A. (UPS) Units shall be provided by security Construction Professional for:
   1. Equipment Racks in MDF / IDF Rooms where Video Surveillance System servers and archiving equipment / hardware is installed.
   2. Equipment Racks in MDF / IDF Rooms where Video Surveillance System network switches, routers, fiber optic receivers and transmitters are installed.

B. (UPS) Units shall be provided and installed at the following locations:
   1. Video monitors, either wall mounted or placed on work surfaces in the Administrative Offices.
   2. All locations where Video Surveillance System client workstations are installed.

C. All UPS Units must be sized adequately to support the complete load connected equipment and to provide battery backup for a minimum of 15 minutes.

D. UPS batteries shall be valve regulated (sealed or maintenance free) lead-acid cell type. Batteries shall be installed within the UPS enclosure or in a standard enclosure provided for that purpose by the UPS manufacturer.

E. Furnish calculations with shop drawings verifying UPS sizing in compliance with these specifications.

2.14 TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS) (Provided by Security Construction Professional)

A. Protect all equipment against surges induced on all control, video, and power cables. All copper cables and conductors which serve as 120V power,

control, or video conductors shall have surge protection circuits installed at each end and locations where conductors enter or exit a building. Fuses shall not be used for surge protection.

B. Surge suppression devices shall meet the following standards/publications:
   1. UL 497B
   2. UL 1449 (must meet 330 Volt suppression rating)
   3. IEEE Category B impulse and ring wave tests

C. Acceptable Manufacturers: Northern Technologies, Inc., EDCO, Ditek. Product shall be warranted against defect for a period of not less than five (5) years.

D. All power connections, including 24 VDC and 24 VAC power supplies and direct wired or plug-in 120 VAC power connections, for all systems and components specified herein, shall be equipped with surge suppression devices. Devices shall be bonded to building grounding system in accordance with Article 250 of the National Electric Code.

E. Grounding: Provide a dedicated, separate No. 6 AWG copper conductor from building grounding system to the security equipment room, security equipment cabinets, and central control room. Connect all lightning protection devices and security equipment non-current carrying metal parts to grounding conductor in accordance with Article 250 of the National Electric Code. Provide ground bus bar in equipment room and control room with dedicated ground conductor to each cabinet, enclosure, pull/junction box and all equipment.

F. Ground Resistance Measurement: Each signal ground system D.C. resistance shall be measured between any point on the signal ground bus and the earth ground. An instrument designed specifically to measure the resistance of a point to each earth ground shall be used. The systems sub–Construction Professional shall measure ground resistance in accordance with the procedure as outlined by the test equipment manufacturer. Instrument shall be Biddle earth resistance test instrument or approved equal.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

A. System components and appurtenances shall be installed in accordance with NFPA 70, manufacturer's instructions, and as shown. Necessary interconnections, services, and adjustments required for a complete and operable signal distribution system shall be provided. Penetrations in fire-rated construction shall be fire-stopped in accordance with contract documents. Conduits and raceways shall be installed in accordance with the National Electric Code (NEC). Cables shall not be installed in the same cable tray, utility pole compartment, or floor trench compartment with AC power cables. Metal conduits shall not be continuous between buildings. Construction Professional to provide ground isolation between

buildings by breaking continuous copper cabling and metal conduit runs.

B. Equipment: All monitor and camera mount support brackets shall be securely attached to mounting surfaces. Use lead shields on solid masonry, wood screws on wood, and machine bolts on structural steel. All anchoring devices shall be rated to support not less than five times the total equipment weight. See installation details for mounting to gypsum board and lay-in ceilings.

C. Surge Protection:
   1. All copper cables and conductors which serve as control, power, or data conductors shall have surge protection devices installed at each end that complies with electrical and security specifications.
   2. Protect all video and data equipment from surges induced on all control, power and data cables. All cooper cables and conductors which serve as control, power, or data conductors shall have surge protection circuits installed at each end that meet the IEEE 472 surge withstand capability test. Fuses shall not be used for surge protection.

D. Power: All interior and exterior cameras shall be powered from central power supplies in the security equipment rooms.

3.02 TESTING

A. Materials and documentation to be furnished under this specification are subject to inspections and tests. All components shall be terminated prior to testing. Equipment and systems will not be accepted until the required inspections and tests have been made, demonstrating that the video distribution system conforms to the specified requirements, and that the required equipment, systems, and documentation have been provided.

B. The Construction Professionals shall complete the Commissioning Form (provided as part of the Bid Document Package). The form must be completed and signed off by the Construction Professionals prior to Final Inspection. Final Inspection of the equipment and systems will not be granted until the required inspections and test have been completed by the Construction Professional.

3.03 LABELING

A. Cable labeling:
   1. All cable and wire installed for VIDEO SURVEILLANCE SYSTEM Systems shall be properly tagged. Use the following standard labeling scheme to identify the physical location of both ends of each cable.
      a. A100 –C1
      b. Camera #: Use one number per cable.
      c. Room number where camera is installed.
      d. Room Camera
      e. Number Number
      f. A100 C-1

g. Format Example
h. A100-C1

B. Complete two (2) labels for each cable, one for each end. Secure label to end of cable, within view of the termination of the cable at each end. Labels shall be white with a protective wrap-around plastic transparent cover that will serve to protect the ink from smearing and secure the label to the cable. All labels shall be typed with black ink.

3.04 TRAINING

A. The Construction Professional shall include in the base Contract all costs required to train owners operating and maintenance personnel in the use and maintenance of systems provided under this section of the Specifications. Training sessions shall be conducted by qualified instructors who are familiar with the equipment and with the system installation. "Quickstart" user guides developed by the Construction Professional shall be presented in these training sessions.

B. Time to be included in base Contracts for specific systems shall be as follows: Video Surveillance Systems- 16 hours.

END OF SECTION 283010

# 31 1000 SITE PREPARATION

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Selective removal and subsequent disposal of utilities, pavements, portions of buildings, and other items indicated to be removed. Extent of demolition work is indicated on Contract Drawings, and in Contract documents.

B. Clearing and grubbing

C. Top soil stripping and stockpiling

### 1.2 MATERIAL OWNERSHIP

A. With the exception of stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property an shall be removed from Project site.

### 1.3 PROJECT CONDITIONS

A. Contractor shall visit the site and become familiar with the existing conditions of the site and make any verification to confirm them. Contractor is to accept the existing conditions of the site and perform the work without additional compensation for discrepancies regarding existing conditions.

B. Contractor is to take all precautions to protect surrounding improvements, utilities and the like. The work shall not extend onto adjacent property unless specified on the drawings.

C. All existing equipment or materials that are deemed salvable by the Owner shall be disconnected and removed by the Contractor and stored as directed by the Owner.

D. The work shall not interrupt pedestrian and vehicular traffic flow to adjacent areas unless other written permission is obtained from those affected and furnished to the Owner or Architect.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. The Contractor is to furnish all tools, barriers, signage and other equipment necessary to execute the work in an accurate and non-hazardous manner.

PART 3 - EXECUTION

3.1 PREPARATION

A. Contractor is to secure the services of a registered land surveyor (registered in the state the work is being performed, hereinafter "the surveyor") to establish the limits of demolition, clearing and grubbing. Any discrepancies in the plans and actual field conditions are to be brought to the Architect's attention immediately and the work shall not continue until the Contractor has been advised by the Architect as to how to proceed.

B. Existing benchmarks or property monumentation is to be marked by the surveyor and preserved by the contractor throughout construction.

3.2 EROSION AND SEDIMENT CONTROL

A. Contractor is to provide all required erosion and sediment control as depicted on the plans. All requirements of the jurisdiction having authority over sediment control are to be met.

B. In the event that phasing sequencing of site preparation requires a modification to the erosion and sediment control plan, the contractor is to notify the engineer and obtain approval of the proposed modification.

C. Contractor is to control erosion and sedimentation throughout construction. The escape of sediment from the site is not permitted.

D. All grassing and/or other stabilization measures shall be installed as soon as permitted by the progress of the work.

E. Additional erosion and sediment control measures may be required by the inspector of the jurisdiction having authority over erosion control. Any additional measures required shall be installed at the contractor's expense.

3.3 TREE PROTECTION

A. Tree protection fencing shall be installed around tree save areas as shown on the drawings or as directed by the authority having jurisdiction prior to beginning construction. Said fencing shall be maintained throughout the duration of the work.

B. No construction vehicle traffic or storage of materials is permitted within the critical root zone of a tree to be protected.

3.4 UTILITIES

A. Contractor is responsible for scheduling the removal and disconnection of utility services and is to coordinate all scheduling with the Owner.

B. Interruption of existing utilities is to be coordinated with the Owner and the utility company. Interruption of utilities is to be kept to a minimum and for the shortest duration possible at no additional cost to the Owner.

3.5 DEMOLITION OF SITE IMPROVEMENTS

A. Any structures, utilities, or other improvements to be removed are to be completely removed unless otherwise indicated on the drawings.

B. All pavement, sidewalk, curb and gutter and other hardscape surfaces to be removed are to be neatly saw-cut and removed.

3.6 CLEARING AND GRUBBING

A. Clearing shall include the removal of all trees, brush, and grassing within the limits of disturbance with the exception of trees shown to remain as shown on the plans to permit the construction of the proposed improvements.

B. Stumps shall be completely removed and disposed of in a manner which is compliant with the jurisdiction having authority and the Owner.

C. Only hand methods may be used for grubbing within tree save areas or critical root zones of trees to remain.

3.7 TOPSOIL STRIPPING

A. Strip topsoil to whatever depths are encountered in such a manner as to prevent intermingling with the underlying subsoil.

B. Topsoil stripping is to be performed immediately after clearing and grubbing or as soon as possible.

C. Remove debris, subsoil, roots, vegetation, and any other material from topsoil.

D. Topsoil is to be stockpiled for respreading in locations to be grassed or landscaped. Topsoil is not to be stockpiled in tree save areas.

E. Excess topsoil is to be removed from the site in a legal manner.

3.8 BACKFILLING OF DEPRESSIONS

A. Depressions caused by clearing and grubbing, demolition, or top soil stripping activity shall be filled with soil compacted as appropriate for the proposed use of the area. Fill shall be placed at a 6-inch loose depth and compacted.

3.9 DISPOSAL

A. All demolished materials, excess soil, topsoil, vegetation, etc. is to be removed from the Owner's property in a manner that is in compliance with applicable laws and regulations.

B. Any recyclable material is to be separated and from non-recyclable material and disposed of to an appropriate off-site recycling location, as necessary.

END OF SECTION 31 1000

# 31 2200 EARTHWORK

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This section includes the following:

1. Excavation for trenches and general excavation

2. Fill placement

3. Backfilling of utility trenches

4. Compaction of fill

5. Preparing subgrade for pavements, building pads, curbs and gutter, walks, and vegetated areas

6. Mass and Fine grading

### 1.2 DEFINITIONS

A. Fill: In terms of volume, defined as a compacted post-construction volume of soil.

B. Subgrade: Surface or elevation remaining after completing the excavation, or top surface of a fill or backfill immediately below subbase or topsoil materials, as applicable.

C. Excavation: Removal of soil material encountered to specified subgrade elevations.

### 1.3 SUBMITTALS

A. Product data for any specified geotextiles or geofabrics.

B. Test reports prepared by a testing agency that include the following:

1. Field density tests for trench

2. Evaluation of fill materials and their classification

3. Moisture content of soils at intervals deemed appropriate for the project by the testing engineer

4. Verification of footing subgrade compaction and bearing pressure of soils by a qualified Geotechnical Engineer.

C. Blasting or rock removal plan, if applicable.

1.4 QUALITY CONTROL

A. All layout work shall be performed by a registered land surveyor.

B. The Owner is the engage the services of a qualified testing agency to conduct independent laboratory and field quality control testing.

C. All work to be performed in accordance with the standard specifications of the State Department of Transportation, hereinafter, "the specification".

D. Testing as the testing agency deems necessary to provide the information in Section 1.3

E. Blasting work or other rock removal methods are to be in accordance with the requirements of the authority having jurisdiction.

F. Any work that effects underground utilities shall be performed per the requirements, and with the coordination of, the authority having jurisdiction or the provider of the utility.

1.5 PROJECT CONDITIONS

A. Contractor shall visit the site and become familiar with the existing conditions of the site and make any verification to confirm them. Contractor is to accept the existing conditions of the site and perform the work without additional compensation for discrepancies regarding existing conditions.

B. Contractor is to take all precautions to protect surrounding improvements, utilities and the like. The work shall not extend onto adjacent property unless specified on the drawings.

C. All existing equipment or materials that are deemed salvable by the Owner shall be disconnected and removed by the Contractor and stored as directed by the Owner.

D. The work shall not interrupt pedestrian and vehicular traffic flow to adjacent areas unless other written permission is obtained from those affected and furnished to the Owner or Architect.

E. Coordinate the location of any storage containers, job trailers, or other equipment with owner.

F. All necessary shoring and barriers are to be provided by the contractor in order for the work to progress in a safe and non-hazardous manner.

G. Unsuitable soils, debris, excess suitable material and other waste material shall be disposed of offsite in a manner suitable to the authority having jurisdiction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The Contractor is to furnish all tools, barriers, signage, stakes, and other equipment necessary to execute the work in an accurate and non-hazardous manner.

B. Fill material following the recommendations of the specifications and the geotechnical report is to be provided when there is not enough from excavation.

PART 3 - EXECUTION

3.1 PREPARATION

A. Contractor is to secure the services of a registered land surveyor (registered in the state the work is being performed, hereinafter "the surveyor") to establish the limits of grading and to stake out all proposed improvements, including but not limited to: proposed building footings, proposed utilities, silt fence, curb and gutter, etc.

B. The surveyor shall locate and clearly mark all property monumentation and benchmarks.

C. Any discrepancies in the plans and actual field conditions are to be brought to the Architect's attention immediately and the work shall not continue until the Contractor has been advised by the Architect as to how to proceed.

D. Existing benchmarks or property monumentation is to be marked by the surveyor and preserved by the contractor throughout construction.

E. The Contractor shall protect and maintain all line and grade stakes throughout construction. Any stakes which are disturbed shall be re-staked by the surveyor at the Contractor's expense.

3.2 EROSION AND SEDIMENT CONTROL

A. Contractor is to provide all required erosion and sediment control as depicted on the plans. All requirements of the jurisdiction having authority over sediment control are to be met.

B. In the event that phasing sequencing of site preparation requires a modification to the erosion and sediment control plan, the contractor is to notify the engineer and obtain approval of the proposed modification.

C. Contractor is to control erosion and sedimentation throughout construction. The escape of sediment from the site is not permitted.

D. All grassing and/or other stabilization measures shall be installed as soon as permitted by the progress of the work.

E. Additional erosion and sediment control measures may be required by the inspector of the jurisdiction having authority over erosion control. Any additional measures required shall be installed at the contractor's expense.

3.3 TREE PROTECTION

A. Tree protection fencing installed at the commencement of the project shall be maintained around tree save areas as shown on the drawings or as directed by the authority having jurisdiction prior throughout the duration of the work.

B. No construction vehicle traffic or storage of materials is permitted within the critical root zone of a tree to be protected.

3.4 GENERAL EXCAVATION

A. Excavate to required subgrade elevations regardless of the type or character of the material encountered. Material encountered may include, rock, unsuitable soil or other debris or deleterious material. If rock, unsuitable soil or other debris or deleterious material is encountered, stop and contact the Architect and await further instruction before proceeding. The contracted sum or construction time shall not be affected by associated work to deal with such material.

1. Unsatisfactory soil material encountered shall be replaced or removed and disposed of, as necessary, and replace with satisfactory soil material.

2. Rock is to be removed to appropriate lines and grades to permit the construction of the proposed improvements.

3. Rock is to be removed to provide ample construction room for utilities. Trench bottoms are to be excavated to a depth of 6 inches below the proposed bottom elevation of the pipe or conduit to be installed. Excavation shall be lowered below the bottom of pipe or conduit elevations for pipe or utilities that have period protrusions or bell and spigot type connections so as to provide a uniform slope for the utility or pipe.

B. Unsuitable Material: Unsuitable Material shall be removed and replaced with suitable material at the direction of the geotechnical engineer. The cost of removal and replacement will be borne by the Contractor.

1. Classification of rock quantities will be performed by the Owner's testing agency. Any rock excavation or removal that is not classified by the testing agency will not receive payment.

2. Payment for rock shall be as per the General Conditions portion of the specification.

3. Unsatisfactory soil material encountered shall be replaced or removed and disposed of, as necessary, and replace with satisfactory soil material.

4. Rock is to be removed to appropriate lines and grades to permit the construction of the proposed improvements.

5. Rock is to be removed to provide ample construction room for utilities. Trench bottoms are to be excavated to a depth of 6 inches below the proposed bottom elevation of the pipe or conduit to be installed. Excavation shall be lowered below the bottom of pipe or conduit elevations for pipe or utilities that have period protrusions or bell and spigot type connections so as to provide a uniform slope for the utility or pipe.

C. Excavate locations of proposed pavement, sidewalk, curb and gutter or other hardscape surfaces to the appropriate subgrade to accommodate the proposed improvement.

D. Any bracing or shoring systems are to be designed by a professional engineer and are required when in close proximity to a building, utilities, poorly compacted areas and other situations. Contractor is to ensure that building foundations, utility bearing areas, and the like are not undermined during excavation an installation.

E. All foundation excavation shall be evaluated by a geotechnical engineer to confirm anticipated soil conditions and bearing pressure before beginning footing construction. If material is unsuitable for foundation construction, then the contractor shall notify the architect immediately and wait for further instructions.

3.5 TRENCH EXCAVATION

A. Contractor is responsible for design of all necessary shoring or bracing systems for pipe installation. Shoring is to be designed by a professional engineer in any situations where conventional excavation or trench boxes cannot be used.

B. Trenches shall not be backfilled until all necessary tests and inspections are performed.

3.6 DEWATERING

A. Unless otherwise specified on the drawings, prevent water from accumulating in general excavation areas and in trenches.

B. Contractor is to construct berms or use other means to prevent the accumulation of water in utility trenches.

C. Utility trenches are not to be used to convey or store runoff. Any water that is accumulated in a trench is to be removed by mechanical means if necessary.

3.7 MATERIAL STORAGE

A. All excavation material is to be stockpiled in a manner to promote positive drainage and prevent erosion.

B. Stockpiled material is to be located as to not interrupt surrounding operations or to effect existing improvements or vegetation. Material is not to be stockpiled in tree save areas or in the critical root zone of trees to remain.

3.8 FILL PLACEMENT

A. Soil materials used shall be approved by the testing agency for the application in which they are to be used. Contractor is to supply written approval, upon request, to the Owner or Architect.

B. The testing agency is to oversee the placement of fill and approve areas for their suitability to receive fill. Suitability of receiving fill shall include visual inspection, by the testing agency, of geometry, presence of unsuitable material, etc.

C. If fill is placed against slopes steeper than 5H:1V, the new fill is to be benched into the existing soils to insure and adequate bonding of the fill with the existing material.

D. Before placing fill proofrolling of the subgrade with a fully loaded tandem-axle dump truck (20 tons) during a period of dry weather shall be performed under the direction of a geotechnical engineer. Any areas which "rut" or "pump" excessively under the weight of proofrolling shall be evaluated by the geotechnical engineer for possible undercutting or other remediation. The Contractor is to follow the recommendations of the geotechnical engineer with regards to remediation and retesting at no cost to the owner.

E. Fill is to be placed in 6" lifts (loose) and compacted to the specified density.

F. Fill is not to be placed on mud, frost, ice, or frozen areas.

G. Structural fill shall be free of organic material and rocks larger than 3 inches in diameter and have a plasticity index less than 20.

H. Utility Trench Backfill:

1. Place and compact bedding course along trench bottoms. Shape the bedding course to provide continuous support for all utility appurtenances and pipes.

2. Compact backfill under pipe haunches carefully and evenly, on both sides, along length in such a manner as to avoid damage to the utility.

3. Remove any shoring or bracing during backfilling operation.

4. Stones over 1 foot in diameter are not permitting in the first one foot of fill over pipe.

3.9 MOISTURE CONTROL

A. Where necessary add water or scarify and dry sub grade material to control the moisture content or as directed by the geotechnical engineer.

B. Moisture content of is to be maintained to 2% plus or minus of optimum moisture content.

3.10 COMPACTION

A. Compaction of soil materials is to be achieved by the use of mechanical soil compaction equipment.

B. Compact soil lifts to not less than the following maximum dry density of Standard Procter, per ASTM D-698:

1. All structural fill shall be compacted to 95%

2. The upper 12 inches of fill that will support slabs, pavements, steps, ramps, or sidewalks to 98%

3. For utility trenches compact all layers to 95%

4. For grassed areas compact to 95%

C. Testing is to be performed by the testing agency under the supervision of a geotechnical engineer. Testing is to be conducted, at a minimum as follows:

1. Underfloor areas and in paved areas, 1 test per 2000 square feet of fill area for each two foot lift but not less than 2 tests.

2. Testing frequency is to be increased in confined areas.

3. One test is to be conducted every 50 linear feet of trench but not less than 1 test.

4. One test every 100 linear feet behind a wall but not less than one test.

3.11 GRADING

A. Site is to be graded such that the final elevations shown on the plans are achieved.

B. Contractor is to grade site so that positive drainage away from the building is provided.

C. Graded areas shall be free of irregularities, bumps or ruts. All areas shall be within 0.10' of the proposed grade.

D. Before beginning construction the Contractor is to review and become familiar with the plans. If any discrepancies between the plans and the actual field conditions or a conflict within the set of other sheets showing elevations, the Contractor is to notify the Architect immediately.

E. Provide uniform slopes between areas of proposed grades and spot elevations shown.

F. Once grading is completed topsoil is to be redistributed in areas to be landscaped at depths indicated on the plans. Topsoil should be placed at 4 inch depths if not specified elsewhere. Topsoil shall be suitable for planting and supporting landscape material and be free of deleterious , clods, and rocks.

G. Final graded areas should be within ½" to ¼" of proposed grades.

H. Contractor shall confirm positive drainage away from building at a minimum slope of 1/8" per foot.

3.12 PROTECTION

A. Contractor to protect all adjacent improvements from direct and indirect actions of grading and excavation activity. Any damaged improvement by shall be restored to like new condition at the Contractor's expense.

B. Contractor is to protect adjacent properties from erosion, excess drainage, debris, dust or other undesirable conditions throughout the course of the work.

C. Existing utilities to remain are to be protected throughout the duration of the project. If additional utilities are discovered, notify the architect/engineer immediately and wait for instructions as to how to proceed.

D. Excavation adjacent to trees or tree save areas is to be performed by hand in a manner to minimize impact to trees to be saved. Ripping or pulling of tree roots is not permitted. Tree roots are to be hand sawn if necessary and removed by hand.

E. Areas that become deformed or depressed during construction shall be reshaped, re-filled, and re-compacted as necessary at the Contractor's expense.

3.13 DISPOSAL AND CLEANUP

A. Excess soil, topsoil, vegetation, etc. is to be removed from the Owner's property in a manner that is in compliance with applicable laws and regulations.

B. Any construction or landscaping debris materials is to be removed from the site and disposed of in an appropriate manner.

END OF SECTION 31 2200

# 31 3116 TERMITE CONTROL

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This section includes specifications for below grade soil treatment to control termites.

### 1.2 QUALITY ASSURANCE

A. All work is to be in compliance with the authority having jurisdiction.

B. Contractor is to furnish workman qualified in dewatering to perform the work.

### 1.3 SUBMITTALS

A. Submit technical data from the manufacturer indicating what chemical is to be used and a copy of its U.S. Environmental Protection Agency's registration number.

B. A professional pest control operator is to be commissioned to apply the soil treatment solution. The pest control operator is to be licensed in accordance with the authority having jurisdiction over the project.

### 1.4 DELIVERY, STORAGE, HANDLING AND PROJECT CONDITIONS

A. Protect containers from accidental opening and use.

B. Do not apply solution when surface water is present. Solution is to be applied per manufacturer's instructions.

### 1.5 WARRANTY

A. Submit a written copy of the warranty that certifies that the termiticide that was applied on this project will prevent infestation of subterranean termites for the warranty period specified.

B. Warranty is to be for a minimum of 10 years. The warranty is to provide coverage, for an amount specified by the owner, for damage to building(s) and its contents. The pest control professional that is selected is to allow the retreatment and extension of the warranty for a specified price to the owner. The warranty is to also provide for retreatment if evidence of termite damage is discovered during the warranty period.

C. The warranty is to specify the solution used, the quantity and the concentration of the solution. The date the solution was applied is also to be specified.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Termiticide approved for termite treatment by the U.S. Environmental Protection Agency and by the authority having jurisdiction.

B. The solution used is to be water-based and not mixed with oils.

C. Any mixture of chemicals must be performed in accordance with the manufacturer's guidelines.

PART 3 - EXECUTION

3.1 APPLICATION

A. The surface upon which the solution is to be applied is to be prepared per the manufacturer's instructions.

B. Soil is to be treated under all slab-on-grade structures before placement of concrete for slabs.

C. The termiticide solution is to be applied in accordance with manufacturer's instruction and per the requirements of the authority having jurisdiction over the work.

D. Apply to solution to all footing, under slab, and attached slab areas. Saturate area around floor slab penetrations. Solution is to be applied on dry, un-frozen ground that is not sloped to convey it away from the desired treatment area.

E. Reapply the treatment solution to treated soils that are disturbed after treatment.

3.2 CLEAN UP

A. All ancillary equipment, debris, etc. that is used for soil treatment is to be removed from the Owner's property in a manner that is in compliance with applicable laws and regulations.

END OF SECTION 31 3116

# 32 1313 SITE CONCRETE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. The work in this section includes the installation of sidewalks, curb and gutter, handicap ramps, and other concrete work that would be found on the site.

### 1.2 RELATED SECTIONS

A. 31 2200 Earthwork

### 1.3 QUALITY ASSURANCE

A. All work shall be done in accordance with the jurisdiction having authority.

B. The State Department of Transportation Specifications shall be considered "the specifications" for the project.

C. Concrete construction and materials to be in conformance with applicable ASTM and ACI standards.

### 1.4 SUBMITTALS

A. The contractor shall submit mix design of concrete to testing agency for compliance with proposed design. The contractor shall then forward the testing agency's reviewed submittal to the Architect. Submittals shall include compliance with applicable standards and dimensions and specifications.

B. Contractor is not to order concrete until mix design is approved by testing agency.

### 1.5 JOB CONDITIONS

A. Contractor shall provide adequate storage for all rebar, form boards, and other materials and equipment. Storage areas are subject to review by the Architect/Engineer and shall not interfere with the operation of any existing facilities unless otherwise approved by the Owner and Architect.

B. Forms shall be keep clean and free of rust, soil, or dried concrete.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. The Contractor is to furnish all tools, barriers, signage and other equipment necessary to execute the work in an accurate and non-hazardous manner.

B. Backfill material per the requirements of the specifications or other authority having jurisdiction.

C. Concrete shall have a compressive strength of 3,000 psi at 28 days with the minimum required air content as per ACI 301 and maximum slump of 3 inches.

D. Water shall be clean and free from salt, oil, or organic substances.

E. Welded wire mesh shall be smooth reinforcement meeting the requirements of ASTM A185.

F. Premolded joint filler: Preformed strips, non-extruding and resilient bituminous type, complying with ASTM D994.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to section 31 2200 Earthwork related compaction, testing, and grading.

3.2 FORMING

A. Set clean timber or metal forms true to line. Firmly stake forms in place, strong enough to resist the pressure of concrete without springing, and tight enough to prevent mortar leakage. Tops of forms shall be at exact finished grade and line.

3.3 CONCRETING

A. Spade concrete thoroughly along expansion joints and forms. Vibrate, tamp and screed as necessary to create a dense mass.

B. Install 1/2 inch wide pre-molded expansion joints as necessary. Cut joints 1/4 inch below finish elevation of concrete surface. Place additional expansion joints around utility structures and other places where concrete abuts other structures.

C. After concrete is placed, screeded, float and trowel to a even smooth surface. Bring sufficient mortar to the surface for the finish.While concrete is workable, score contraction joints using scoring tool.

D. Broom finish using new broom such that bristle marks shall be perpendicular to the length of the sidewalk.

E. For concreting in colder temperatures, Contractor is to adhere to the requirements of ACI 306.1-90 Standard Specification for Cold Weather Concreting. Concrete temperature is not to drop below 50 degrees Fahrenheit.

3.4 CURING

A. After concrete has been given final surface finish, it is to be protected and allowed to cure. Protective impervious plastic sheets are to be used as necessary.

B. While curing concrete is to be protected from foot traffic and equipment.

C. In cold weather, Contractor is to adhere to the requirements of ACI 306.1-90 Standard Specification for Cold Weather Concreting. Concrete temperature is not to drop below 50 degrees Fahrenheit.

3.5 SIDEWALK CONSTRUCTION

A. Finish the outside edge of the slab and all joints with a 1/4" radius edging tool.

B. Construct in accordance with detail shown on plans.

3.6 CURB AND GUTTER

A. Construct in accordance with detail shown on plans.

3.7 BACKFILL COMPLETION

A. Compact backfill as specified in Earthwork section.

B. After the concrete has set sufficiently, the grading shall be completed to the lines shown on the plans

C. Areas that were previously grassed are to be restored to their pre-developed state.

3.8 CLEANING

A. All construction debris from concrete construction is to be properly disposed of.

B. Additional soil from construction that cannot be used elsewhere on-site is to be disposed of at no cost to the owner.

END OF SECTION 32 1313

# 32 3113 CHAIN LINK FENCES AND GATES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. The work includes furnishing all materials, labor and equipment to install chain link fencing, gates, and required accessories.

### 1.2 QUALITY ASSURANCE

A. All work is to be in compliance with the standards of the authority having jurisdiction.

B. Contractor is to furnish workman qualified to perform the work.

C. All work and materials that apply to this section art to be in accordance with the applicable sections of the American Society for Testing and Materials (ASTM) standards.

D. All materials and installation shall be in accordance with the Chain Link Fabrication Manufacturer's Association's (CLFMA) requirements.

E. The manufacturer and installer must have a minimum of 5 years in the fence manufacturing and installation experience, respectively.

F. Contractor is required to have the owner perform a visual inspection once complete. Any insufficiencies in the finished installation are to be remediated. The contractor is to bear the cost of the remediation work.

### 1.3 SUBMITTALS

A. Product information on the material properties of the fence fabric, posts along with shop drawings of the fence layout and post foundations are to be submitted to the Architect.

### 1.4 PROJECT CONDITIONS

A. Contractor is to verify the layout of the fence. If any discrepancies with the existing conditions or other proposed improvements are discovered then those discrepancies are to be brought to the Architect's attention. The work is not to begin until the discrepancies are resolved.

B. Coordinate the fence installation with the installation of underground utilities. Fence posts are not to be placed above existing or proposed underground utilities.

1.5 WARRANTY

A. The manufacturer's warranty is to be provided to the Owner. The Warranty is to warrant any defects such as rust or corrosion for a period not less than 10 years from substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers are subject to compliance with these specifications; the following manufacturers that are acceptable include, but are not limited to:

1. Allied Tube and Conduit: www.alliedeg.us
2. American Fence: www.americanfence.com
3. Circle A Fences: www.circleafences.net

2.2 MATERIALS

A. Portland Cement Concrete is to be used per the appropriate ASTM standard. Top of footing is to be shaped in a sloped fashion to provide positive drainage away from the post.

B. Fence Fabric shall be to the height as shown on the plans. Fence fabric shall have a 2" mesh with 11-gauge wire core thickness. Wire shall be polymer (vinyl) coated in accordance with ASTM F668. Vinyl coating shall be black unless specified otherwise on the drawings of 0.022 inch thickness.

C. Post Schedule

| Description | Outside Diameter (in.) | Weight (lbs/ft) |
|---|---|---|
| Top Rail | 1.66 | 2.27 |
| Line Post | 2.375 | 2.65 |
| Terminal, Corner Angle, End & Pull Pull Post | 2.875 | 5.79 |
| Swing Gate Post | 2.875 | 5.79 |
| Gate Frames | 1.90 | 2.72 |

D. Tension Wire at Bottom of Fence Fabric: 6-gauge steel vinyl finish wir, continuous and connected to all end and terminal posts.

E. Provide metal parts with vinyl coating. Coating is to be a minimum of 0.022 inches in thickness.

F. Fittings must comply with ASTM F 626.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fence posts per manufacture's requirements. All posts are to be set in concrete per manufacturer's recommendation.

B. Install fence to height and in location specified on the drawings.

C. Procure the services of a licensed land surveyor to stake location of the proposed fence terminal posts and gates. Straight sections of fence are to be staked at intervals no greater than 100-ft.

D. Playground, detention pond and other areas to be fenced are not to be fenced until the area they enclose have been ceased from construction activity. Detention pond's requiring an as-built signoff from the municipality shall not be fenced until the signoff has been obtained.

E. Space fence posts at intervals not to exceed 10-ft, center to center, between angle, corner, terminal and gate posts.

F. Fences are to be installed with top rails that are to be secured at ends with rail-end fittings. Top rails are to pass through eye tops on posts.

G. Install tension wire 3-inches above grade and tension and connect to end posts in a manner to prevent loss of tension or slippage.

H. Fence fabric is to be installed along outside face of fence posts and is to be tensioned per the manufacturer's requirements and attached to corner, angle, gate, or end post with tension bars that extend the full height of the fabric and bands.

I. Bands and ties are to be installed per manufacturer's recommendation.

J. Fence fabric is to be installed ½" above finished grade and to be attached along top with wire ties. Wire ties are to be installed as to not create a safety hazard. Ties are to be 18 inches apart or as recommended by the manufacturer.

3.2 GATE INSTALLATION

A. Fence Gate: Install fence gate per manufacturer's instructions. Fence fabric is to be installed over the gate as previously described. Gates are to be set to open both ways without obstructions. Contractor is to furnish any materials, including lubricants, necessary to establish correct operation of gate. Gates are to be of the size and in the location indicated on the drawings.

3.3 FENCING ADJUSTMENT

A. In situations where fencing is to be adjusted due to proposed grades being raised or lowered fence posts and fabric are to be reinstalled as necessary per this specification or the manufacturer's guidelines.

3.4 CLEANUP

A. Remove any construction waste or debris from the project site and dispose of in a legal manner.

3.5 INSPECTION AND TESTING

A. Contractor is to coordinate visual inspection by the owner or the owner's representative. Any areas that are found to be defective are to be remedied by the contractor before final inspection. Any remedial repairs are to be performed under the supervision of the testing agency at the Contractor's expense.

END OF SECTION 32 3113

# 33 1000 WATER SYSTEM

## PART 1 - GENERAL

### 1.1 SUMMARY

A. The work in this section includes the installation of water system piping, water valves, fire hydrants, and other appurtenances.

### 1.2 RELATED SECTIONS

A. 31 2200 Earthwork

### 1.3 QUALITY ASSURANCE

A. All work shall be done in accordance with the jurisdiction having authority.

B. All work shall be performed in accordance with AWWA Specifications, latest addition unless otherwise noted.

### 1.4 SUBMITTALS

A. The contractor shall submit cut sheets of all products proposed for review to the Engineer via the Architect. Submittals shall include compliance with applicable standards and dimensions and specifications.

### 1.5 STORAGE AND HANDLING

A. Inspect pipe and appurtenances at delivery and before installation for damage. Reject any damaged items.

B. Protect stored piping and appurtenances from moisture and soil.

C. Any PVC piping is to be stored from direct sunlight.

### 1.6 COORDINATION

A. Coordinate any utility shutdowns or interruptions with Owner. Notify owner 2 weeks before any scheduled shutdowns and obtain approval before proceeding.

B. All taps of public water system are to be coordinated with the authority having jurisdiction over the public water system.

### 1.7 SUBMITTALS

A. Submit product data for all pipes, valves, protective enclosures, fire hydrants, fire department connections, post indicator valves, etc. to be used.

1.8 QUALITY ASSURANCE

A. Comply with the specifications and regulations of the authority having jurisdiction over the public water system.

B. All fire protection piping and appurtenances shall be installed and in compliance with NFPA and the applicable fire code requirements.

C. Piping shall bear the markings of the standards it is in compliance with.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The Contractor is to furnish all tools and other equipment necessary to execute the work in an accurate and non-hazardous manner.

B. Backfill material per the requirements of the authority having jurisdiction.

C. Piping, valves, hydrants and other water system appurtenances as indicated on the drawings.

2.2 COPPER TUBE

A. Shall be per the requirements of ASTM B88, Type "K" annealed temper seamless copper tube.

2.3 DUCTILE IRON PIPE (DIP)

A. Shall be pressure class 350 and centrifugally cast in accordance with ANSI A21.5 and AWWA C151.

B. Exterior shall be asphaltic coated in accordance with ANSI/AWWA C151/A21.51.

C. Interior shall be cement-mortar lined in accordance with ANSI/AWWA C104/A21.4.

D. Rubber Gasket joints shall be in accordance with ANSI/AWWA C111/A21.11

E. Fittings shall be push on or mechanical type joints in accordance with ANSI/AWWA C111/A21.11 latest revision.

F. Other reference specification ASTM A716-08.

2.4 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. All pipe shall be manufactured in accordance with ASTM D2241and shall be SDR 35 and shall be certified to NSF International Standard No. 61.

B. Joints shall be gasketed, push-on type conforming to ASTM D3139.

C. Lubricant shall be as recommended by the pipe or fitting manufacturer and shall not adversely affect the potable qualities of the water to be distributed by the system.

D. Installation shall be in accordance with ASTM D2321 and specification.

2.5 FIRE HYDRANTS

A. Fire hydrants shall be manufactured to comply with AWWA C502, latest revision and shall be designed for 250 pounds working pressure or as required by authority having jurisdiction.

B. If the authority having jurisdiction does not specify what type of hydrant is to be used then hydrants shall be Mueller Co. Supper Centurion or approved equal.

2.6 GATE VALVES

A. If not specified by the authority having jurisdiction then gate valves one and on half inch and smaller shall be bronze body, solid wedge type, rated with a working pressure of 200 psi, NIBCO or approved equal.

B. All gate valves shall have mechanical joints and a static test pressure of 500 psi.

C. Gate valves two inches and larger shall be Mueller P- 2360 series M&H C500 series or approved equivalent.

2.7 POST INDICATOR VALVES (PIV)

A. All post indicator valves shall have a tamper proof switch or lock as per the authority having jurisdictions requirements.

B. All materials shall be manufactured and tested in accordance with the appropriate ANSI/ASTM standard and shall be UL Listed and FM approved and shall meet the requirements of NFPA.

2.8 WATER METERS, BACKFLOW PREVENTORS, DETECTOR CHECK VALVES

A. All water meter vaults, backflow prevention devices, detector check valves, vaults access lids and associated appurtenances, in addition to the tap that serves them, shall be in compliance with the standards of the authority having jurisdiction and AWWA requirements.

B. Coordinate the installation of these devices with the authority having jurisdiction over the domestic water system and fire protection systems. Any work that is not required to be performed by the authority having jurisdiction is to be inspected before being covered.

2.9 NON-BUILDING MOUNTED FIRE DEPARTMENT CONNECTIONS (FDC)

A. Shall be Siamese type connections or, if required by the jurisdiction having authority, a Storz type connection.

B. Siamese connections shall be capable of providing 250 GPM flow (minimum), per 2-1/2" inlet.

C. Inlet connection shall be brass body with integral drop-clapper inlets and female NPT outlets and shall be provided with plugs and chains, with identification plate.

D. Storz type fire department connections shall be equipped with a 4" outlet with cap and chain in compliance with all applicable NFPA standards.

2.10 PROTECTIVE ENCLOSURES

A. Approved manufactures are Hot Box, Inc. and Watts Industries, Inc. or approved equivalent

B. Are to meet the requirements for freeze protection in the area in which they serve. May be of fiberglass or aluminum construction and adequately insultated.

C. Should contain electric heating equipment to prevent freezing of above ground water piping.

D. Shall be placed on concrete pad and provide drainage for potential leaks.

2.11 CORPORATION COCKS

A. If not specified by the municipality having jurisdiction over the water system, cock shall be a Ford model F600, Hayes Model 5200, or approved equal.

2.12 TAPPING SLEEVES AND VALVES

A. Shall be as approved by the jurisdiction having authority.

B. If not specified by the jurisdiction then sleeves shall be Mueller, mechanical joint, 200 psi, H-615 or approved equal and tapping valves shall be Mueller, mechanical joint, 200 psi, T-2360 series, or approved equal.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to section 31 2200 for Earthwork related to installation of storm sewer.

3.2 WATER SYSTEM CONSTRUCTION-GENERAL

A. Contractor is to engage the services of a registered land surveyor to stake all of the water system locations and elevations for piping, hydrants, valves, etc. per the plans.

B. Piping and appurtenances are to be inspected and tested during construction and prior to backfilling. Any damaged structures, pipe, or other appurtenances are to be removed and replaced with new.

C. Water system pipes and structures are to be properly installed and backfilled before being subjected to loading. Any structures or piping that become damaged or displaced due to loading without adequate backfill shall be removed and replaced or reinstalled.

D. Castings for valves, meter boxes, etc. shall be made integral with the structure and be stable and sturdy under loading.

E. Tops of structures shall be set flush with grade in accordance with the drawings.

F. Valve frames and covers in earth are to have a concrete collar block cast-in-place around it, 18 by 18 by 6 inches deep with top one inch above surrounding grade.

G. Valve frames and covers tops in paved areas are to be flush with grade.

H. Pipes and fittings shall be installed per AWWA C-600

3.3 WATER SYSTEM CONSTRUCTION- GENERAL

A. All existing tie-in and conflicts and pipe sizes are to be verified before beginning construction. Any discrepancies that are discovered between the plans and actual field conditions are to be reported to the engineer immediately and the contractor is to wait for further instruction.

B. Construct pipe in a safe, non-hazardous manner, while minimizing interruptions in service to existing facilities. Any interruption in water service shall be coordinated with the owner and approval obtained. Contractor shall submit to the Owner 1 week prior to any necessary interruption, a plan stipulating how long the service will be interrupted, what areas will be effected and backup plans to provide water and fire protection to the building in the event the interruption takes longer than expected. The Owner must approve the interruption before the Contractor can commence with work.

C. Install piping to specified location and elevations shown on plans.

D. All piping is to be carefully placed into trench. Under no circumstances shall any pipe or fitting be dumped or rolled into the trench or be allowed to drop against the pipe or fitting already in the trench. Contractor is responsible for the replacement and removal of any damaged pipe, fittings or appurtenances.

E. Construct piping to accurate lines and grades avoiding high points. Support as required.

F. At the end of the day the end of the water line under construction is to be plugged to prevent debris from entering the line.

G. Install all piping per manufacturer's recommendations.

H. Notch out bottom of trench for bell and spigot or mechanical joints.

I. Cutting of pipe is to be in accordance with manufacturer's recommendations. The work shall be done in a satisfactory manner to leave a smooth end at right angles to the axis of the pipe and not otherwise damage the pipe or liner.

J. Water line shall be constructed to have a minimum of 48 inches of cover measured from the proposed grade to the top, outside, of the pipe. At locations where water lines cross sanitary sewer lines, 18 inches of clearance is to be maintained between the pipes.

3.4 CONSTRUCTION OF DUCTILE IRON PIPE AND FITTINGS

A. Water mains and fittings shall be installed in accordance with the requirements of AWWA C-600.

3.5 CONSTRUCTION OF PVC PIPE AND FITTINGS

A. Install according to AWWA M23 and ASTM F 645

3.6 THRUST BLOCKING

A. Thrust blocking shall be constructed in conformance with AWWA C600, at a minimum.

B. Concrete for thrust blocks and thrust collars shall have a minimum compressive strength of 3,000 PSI at 28 days.

C. Underground piping laid around curves and at all unsupported changes of direction, all tees, wyes, crosses, plugs and other like fittings shall be solidly and properly blocked with concrete against solid earth to take the reaction of the main pressure and to prevent lateral movement of the pipe or fittings when under pressure. Reaction blocking shall be installed at all locations requiring same and where tie rods and clamps are not called for in the plans.

D. Blocking, unless shown shall be so placed that the pipe and fitting joints will be accessible for repair.

3.7 PROTECTIVE ENCLOSURE INSTALLATION

A. Protective enclosures shall be installed per the manufacturer's recommendations.

B. Enclosure is to sit on concrete pad. Pad is to be approximately 2 inches above grade.

3.8 TESTING

A. After all piping has been placed, each section shall be tested by the Contractor in the presence of the Inspector and tests shall be continued until all leaks have been made tight to the satisfaction of the Inspector. The Contractor shall furnish all necessary equipment and other materials necessary to conduct the test as required.

B. Prior to the pressure test, pipe laid in trenches shall be backfilled adequately to secure the pipe during the test. Any observed leakage shall require corrective measures to pipe lines and/or joints to the satisfaction of the Inspector.

C. Piping shall undergo a hydrostatic pressure test in accordance with AWWA Standard C600, latest revision.

D. Testing shall be in accordance with the jurisdiction having authority over the water system.

3.9 DISINFECTION

A. After leakage testing, and all necessary repairs have been made, the lines shall be flushed clean and then disinfected in strict accordance with AWWA Standard For Disinfecting Water Mains, C651, latest revision.

B. All disinfection procedures shall be coordinated with the Inspector.

C. No water piping system shall be placed in service until written approval is obtained from the jurisdiction having authority over the water system.

D. Follow the specific procedure of the jurisdiction having authority to conduct disinfection.

E. Contractor is responsible for all erosion control during testing.

3.10 PIPE AND VALVE IDENTIFICATION

A. Install mylar detection tape and/or other detectable wire, during backfill operations, above nonferrous pipe or any pipe having more than six (6) feet of cover. Detection tape or wire shall be installed centered, approximately 12 to 18 inches above the pipe.

3.11 PROTECTION

A. Contractor is responsible for protecting adjacent improvements and utilities. Any repair of damaged utilities and/or improvements shall be borne by the contractor.

B. Any piping or appurtenances that become damaged by other construction activity are to be replaced by the Contractor at the Contractor's expense.

3.12 BACKFILL COMPLETION

A. Compact trench backfill as specified in Earthwork section.

B. Construct pavement patch, if applicable, to restore finished surface to like new condition. Construct finish surface to provide smooth transition to existing surface.

C. Areas that were previously grassed are to be restored to their pre-developed state.

3.13 CLEANING

A. All construction debris from storm sewer construction is to be properly disposed of.

B. Additional soil from sewer pipe construction that cannot be used elsewhere on-site is to be disposed of at no cost to the owner.

END OF SECTION 33 1000

# 33 3000 SANITARY SEWER SYSTEM

## PART 1 - GENERAL

### 1.1 SUMMARY

A. The work in this section includes the installation of sanitary sewer piping, manholes, cleanouts and other appurtenances.

### 1.2 RELATED SECTIONS

A. 31 2200 Earthwork

### 1.3 QUALITY ASSURANCE

A. All work shall be done in accordance with the standards and specifications of the jurisdiction having authority.

B. The latest standards and specifications of the authority having jurisdiction shall be considered "the specifications" for the project.

### 1.4 SUBMITTALS

A. The contractor shall submit product data and other material to demonstrate the compliance with the requirements of these specifications of all products proposed for review to the Engineer via the Architect. Submittals shall include compliance with applicable standards, dimensions and specifications.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. The Contractor is to furnish all tools, barriers, signage and other equipment necessary to execute the work in an accurate and non-hazardous manner.

B. Backfill material per the requirements of the specifications or other authority having jurisdiction.

C. Piping, cleanouts, manholes and other appurtenances as indicated on the drawings.

### 2.2 DUCTILE IRON PIPE (DIP)

A. Shall be pressure class 350 and centrifugally cast in accordance with ANSI A21.5/ AWWA C151 and ASTM A74.

B. Exterior shall be asphaltic coated in accordance with ANSI/AWWA C151/A21.51.

C. Interior shall be cement-mortar lined in accordance with ANSI/AWWA C104/A21.4.

D. Rubber Gasket joints shall be in accordance with ANSI/AWWA C111/A21.11

E. Fittings shall be push on or mechanical type joints in accordance with ANSI/AWWA C111/A21.11 latest revision. All ductile iron fittings shall have a minimum working pressure rating of 250 psi and minimum iron strength of 25,000 psi. All fittings shall be cement mortar lined in accordance with AWWA C104/ ANSI A21.4 and the outside shall be bituminous coated.

F. Other reference specification ASTM A716-08.

2.3 POLYVINYL CHLORIDE (PVC) PIPE

A. All pipe shall be manufactured in accordance with ASTM D2241and shall be SDR 35.

B. Joints shall be gasketed, bell-and-spigot, push-on type conforming to ASTM D3212.

C. Installation shall be in accordance with ASTM D2321 and specification.

D. Pipes and Fittings: All PVC pipe and fittings through 15" shall meet the requirements as specified under ASTM D3034. All pipe and fittings shall be suitable for use as a sanitary sewer conduit. Bell joints shall consist of an integral wall section with elastomeric gasket joint which provides a water tight seal. Standard laying lengths shall be 13.0 - 20.0 feet (+ 1 inch). The pipe shall be capable of passing all test which are detailed in this specification. Minimum wall thickness for pipe through 15" in diameter shall be as specified under SDR 26 in ASTM D3034. PVC is not allowed for sewers greater than 18" in diameter or more than 18 feet of cover.

E. Each length of pipe shall be marked with the manufacturer's name, trade name, nominal size, class, hydrostatic test pressure, manufacturer's standard symbol to signify it was tested, and date of manufacture. Each rubber ring shall be marked with the manufacturer's identification, the size, the year of manufacture, and the classes of pipe with which it can be used.

F. All PVC fittings and accessories shall meet the requirements specified under ASTM D3034 or F679 and shall be manufactured and furnished by the pipe supplier. They shall have bell and/or spigot configurations compatible with that of the pipe and shall have an equivalent wall thickness.

2.4 CLEANOUTS

A. Before ordering materials, contractor is to submit shop drawings showing manufacturers information and specifications for cleanouts.

B. No material is to be ordered until engineer has reviewed the shop drawings.

C. Shall be traffic rated

2.5 PRECAST STRUCTURES

A. Precast structures shall be constructed in compliance with ASTM C 478-09 and the specification. Manhole diameters shall be 4-foot minimum.

B. Precast structures joints shall be tongue and groove. Steel reinforcement shall meet the requirements of ASTM A-185, latest revision. Cement shall meet ASTM C-150, latest revision.

C. Each section of the structure shall be stamped with the name of the manufacturer, the date of the section was manufactured and where it was manufactured.

D. Precast manholes shall be constructed of Portland Cement concrete with a compressive strength of not less than 4,000 pounds per square inch at an age of 28 days. The wall thickness shall not be less than 5 inches. Manholes over 12' deep shall be placed on a reinforced slab.

E. Sections shall be joined using O-ring rubber gaskets, flexible plastic gaskets conforming to the applicable provisions of ASTM C443, or an approved bituminous joint material. Precast concrete manholes shall consist of precast reinforced concrete sections with eccentric, top section and a base section

F. Structures shall be installed per specification and manufacturer's guidelines.

G. If not specified by the authority having jurisdiction or the specification, all steps shall be M.A. Industries PS2-PF encased per ASTM D 4101 or approved equal. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit if structure is less than 3-ft in depth.

H. Manhole frames and covers shall be traffic rated cast iron with a coat of asphaltic paint applied at the foundry, 24-inch inside diameter by 7" to 9" riser with 4 inch minimum width flange and 26-inch diameter cover or as specified on the drawings or by the authority having jurisdiction.

I. Pre-molded rubber boots with stainless steel bands shall be used for connecting sewer pipe to manholes. The boot shall be sized to suit the outside diameter of the type pipe being used.

J. Brickwork required to complete the precast concrete manhole shall be constructed using 1 part Portland cement to 2 parts clean sand, meeting ASTM Specifications, Serial Designation C 144, thoroughly mixed to a workable plastic mixture. Brickwork shall be constructed in a neat and workmanlike manner. Cement mortar shall be used to grout interior exposed brick joints and faces. No more than 4 courses of brick with 12 inch maximum total depth of bricks may be used to adjust manhole covers.

K. The manhole base shall be set upon a minimum 6 inch thick bed of #57 crushed stone.

2.6 CASING PIPE AND SPACERS

A. Steel casing pipe shall be schedule 40 thickness with a minimum yield strength of 35,000psi and shall conform to the requirements of ASTM A139. It shall be fully coated on the exterior and interior with a bitumastic coating. The casing pipe diameter shall be six to eight inches greater than the "bell" diameter of the carrier pipe.

B. Wherever steel casing is required, the carrier pipe shall be ductile iron pipe with push-on joints. Approved spacers shall be used to secure the pipe on grade. A manhole shall be placed at each end of the cased section at a distance of 5 to 10 feet beyond the end of the casing. Ductile iron pipe shall be continuous from manhole to manhole.

2.7 CONCRETE AND MORTAR

A. Concrete shall consist of Portland cement, a fine aggregate, a coarse aggregate and water. Portland cement shall conform to Fed. Spec. SS-C-19 lb. Fine aggregate shall be a clean, sharp, well-graded sand conforming to Fed. Spec. SS-S-51. Coarse aggregate shall be uniformly graded broken stone or gravel which will pass a 1-1/2 inch screen and be retained on a 1/4 inch screen. Aggregate shall be free of clay, loam silt, or organic matter. Water used for concrete shall be clean and free from vegetable, sewage or organic matter and the total amount used shall not exceed six (6) gallons per sack of cement. Forms may be of wood or metal properly braced to prevent bulging. Concrete shall be thoroughly mixed and well vibrated into forms and around fittings. Exposed surfaces of concrete shall be protected from premature drying by being kept covered and moist for a period of seven days. After the forms have been removed, the voids in the interior surface, if any, shall be properly filled with cement mortar and the whole surface rubbed uniformly with neat cement.

B. All mortar shall be composed of one part Portland cement to three parts sand, conforming to these specifications. All concrete shall have a compressive strength of not less than 3,000 pounds per square inch at an age of 28 days.

C. Approved casing spacers shall be used to secure the sewer line on grade throughout the length of the casing. The spacers shall be sufficient to secure the pipe on grade.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to section 31 2200 for Earthwork related to installation of storm sewer.

3.2 SANITARY SEWER SYSTEM CONSTRUCTION-GENERAL

A. Contractor is to engage the services of a registered land surveyor to stake all sanitary sewer locations and elevations of piping, structures, cleanouts, etc. per the plans.

B. Piping and structures are to be inspected during construction and prior to backfilling. Any damaged structures, pipe, or other appurtenances are to be removed and replaced with new.

C. Sanitary sewer pipes and structures are to be properly installed and backfilled before being subjected to loading. Any structures or piping that become damaged or displaced due to loading without adequate backfill shall be removed and replaced or reinstalled.

D. Castings to be placed on top of sanitary sewer structure shall be made integral with the storm structure and be stable and sturdy under loading.

E. Tops of structures shall be set flush with grade in accordance with the drawings.

F. Eccentric tops shall be utilized to insure that manhole steps are accessible for entrance.

G. Cleanout frames and covers in earth are to have a concrete collar block cast-in-place around it, 18 by 18 by 6 inches deep with top one inch above surrounding grade.

H. Cleanout frames and covers tops in paved areas are to be flush with grade.

3.3 PIPE INSTALLATION

A. All existing tie-in and conflict inverts and pipe sizes are to be verified before beginning construction. Any discrepancies that are discovered between the plans and actual field conditions are to be reported to the engineer immediately and the contractor is to wait for further instruction.

B. Construct pipe from lowest invert elevation to highest. Install piping to specified location and elevations shown on plans.

C. Trenches shall be cut true to lines and grades shown on the plans. The bottom of the trench shall be cut carefully to the required grade of the pipe except where bedding materials or cradles are shown in which case the excavation shall extend to the bottom of the bedding or cradles as shown on the plans. Where pipe bells are to be placed the trench shall be excavated at proper intervals so the barrel of the pipe will rest for its entire length on the bottom of the trench bedding. Holes for bells shall be large enough to permit the proper installation of all joints in the pipe.

D. Trenches shall have a minimum width of twelve (12) inches plus the diameter of the outside of the bell of the sewer main and the maximum trench width at the centerline of the pipe shall not be more than the nominal diameter of the pipe plus two feet.

E. Shoring and Bracing: Excavations adjacent to proposed or existing buildings and structures, or in paved streets or alleys shall be sheeted, shored and braced adequately to prevent undermining or subsequent settlement of such structures or pavements. Underpinning of adjacent structures shall be done when necessary to maintain structures in safe condition. The contractor shall also provide bracing and shoring when required to prevent damage to existing utilities, trees, or private property which are specifically required to remain.

F. Where a sanitary sewer crosses a water main, there shall be a minimum vertical separation clearance of 18 inches between the mains. Both lines shall be DIP and one full length of sewer pipe must be located so that both joints are as far from the water main as possible. In cases where sanitary sewer lines parallel water mains, there shall be a minimum of ten (10) feet horizontal separation maintained between the mains. These distances are measured from the outside edge to outside edge of the pipes.

G. Rock in trenches shall be excavated over the horizontal limits of excavation and to depths as follows:

| Size of Pipeline | Depth of Excavation Below |
|---|---|
| Inches | Bottom of Pipe, Inches |
| 4 to 6 | 6 |
| 8 to 18 | 8 |

H. Pipe Joints: The ends of pipe to be jointed and the gaskets shall be cleaned immediately before assembly, and the assembly shall be made as recommended by the pipe manufacturer. Lubricant used must be non-toxic and supplied or approved for use by the pipe manufacturer.

I. When pipe laying is not in progress, the open ends of installed pipe shall be plugged by approved means to prevent entrance of trench water into the line.

J. DIP shall be installed per ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51.

K. DIP or PVC pipe laid in rock trenches shall have 6 inches of crushed stone under the pipe.

L. Water shall not be allowed to run or stand in the trench before the trench has been backfilled. At no time shall the Contractor open up more trench than his available pumping facilities are able to dewater. The contractor will be required to provide and operate any equipment necessary to keep the trenches free from water while pipe is being laid and the joints made.

M. Coring Manholes: Connections to existing manholes where no plugged stubs exist shall be made by neatly cutting a hole in the wall of the existing structure with a coring machine at or near its invert, inserting a Kor-N-Seal, or approved equivalent, rubber boot.

N. In rock excavation, the backfill from the bottom of the trench to one foot above the top of the pipe shall be finely pulverized soil, free from rocks and stones. The rest of the backfill shall not contain over 75% broken stone, and the maximum sized stone placed in the trench shall not weigh over 50 pounds. Excess rock and fragments of rock weighing more than 50 pounds shall be loaded and hauled to disposal. If it is necessary, in order to comply with these specifications, selected backfill shall be borrowed and hauled to the trenches in rock excavation.

3.4 BACKFILL COMPLETION

A. Compact trench backfill as specified in Earthwork section.

B. Construct pavement patch, if applicable, to restore finished surface to like new condition. Construct finish surface to provide smooth transition to existing surface.

C. Areas that were previously grassed are to be restored to their pre-developed state.

D. Sheeting, shoring, and bracing is to be removed and disposed of in an acceptable manner. Where sheeting is used in connection with the work, it is in no case to be withdrawn before the trench is sufficiently filled to prevent damage to banks, road surfaces, adjacent pipes, adjacent structures or adjacent property, public or private.

3.5 CLEANING

A. All construction debris from sewer construction is to be properly disposed of.

B. Additional soil from sewer pipe construction that cannot be used elsewhere on-site is to be disposed of at no cost to the owner.

3.6 INSPECTION AND TESTS

A. Inspection and testing shall be performed in accordance with the jurisdiction having authority.

B. Lines, manholes and other appurtenances are to be tested for infiltration, exfiltration, deflection, and damage.

C. Acceptance of sanitary sewer system will not occur until all tests have been performed and acceptable results have been achieved on all items required to be tested.

END OF SECTION 33 3000