

# Contract Documents & Technical Specifications



## Clinton County Conservation Office Remodel & Addition



WORKING ON TOMORROW.

Origin Design Project Number **22163**

### Origin Design Co.

5405 Utica Ridge Road, #200  
Davenport, IA 52807

Phone: 563 823-0192

Fax: 563 556-7811

**origindesign.com**



Clinton County Conservation  
Conservation Office Remodel & Addition

SECTION 000101 - PROJECT TITLE PAGE

Project	Clinton County Conservation Office Remodel & Addition 2308 255 <sup>th</sup> Street Grand Mound, IA 52751
Owner	Clinton County Conservation 2308 255 <sup>th</sup> Street Grand Mound, IA 52751  Phil Visser, Executive Director, Clinton County Conservation Board 563-357-2005 <a href="mailto:pvisser@clintoncounty-ia.gov">pvisser@clintoncounty-ia.gov</a>
Architect	Origin Design 5405 Utica Ridge Road, #200 Davenport, Iowa 52807  Michael McNeil, AIA, NCARB 563 823-0192 <a href="mailto:mike.mcneil@origindesign.com">mike.mcneil@origindesign.com</a>
Structural Engineer	Origin Design 137 Main Street, Ste. 100 Dubuque, Iowa 52002  Emily Crowe, PE 563 556-2464 <a href="mailto:emily.crowe@origindesign.com">emily.crowe@origindesign.com</a>
Mechanical Engineer	Modus Engineering 118 College Street, Suite 200 Iowa City, IA 52240  Kevin Panczyk, P.E. 319 348-4600 <a href="mailto:kpanczyk@modus-eng.com">kpanczyk@modus-eng.com</a>
Electrical Engineer	Modus Engineering 118 College Street, Suite 200 Iowa City, IA 52240  Kevin Panczyk, P.E. 319 348-4600 <a href="mailto:kpanczyk@modus-eng.com">kpanczyk@modus-eng.com</a>

Clinton County Conservation  
Conservation Office Remodel & Addition

Plumbing / Fire Protection Engineer

Modus Engineering  
118 College Street, Suite 200  
Iowa City, IA 52240

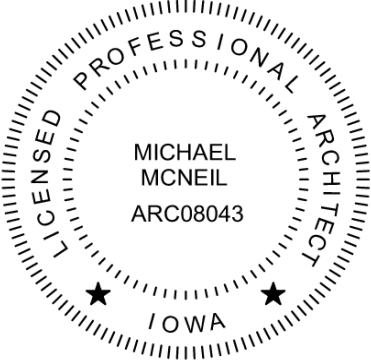

Kevin Panczyk, P.E.  
319 348-4600  
[kpanczyk@modus-eng.com](mailto:kpanczyk@modus-eng.com)

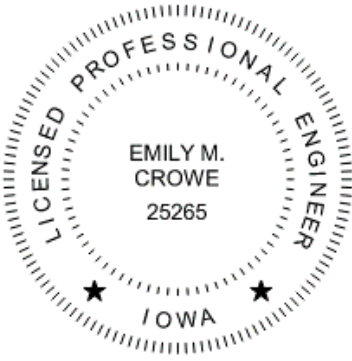



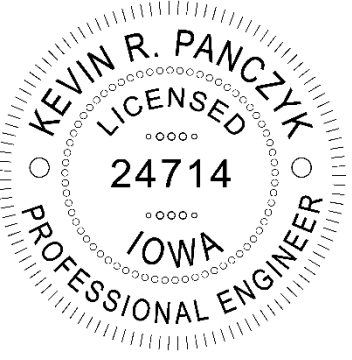
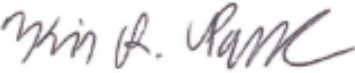
**CERTIFICATIONS**

Origin Design  
 5405 UTICA RIDGE ROAD - SUITE 200  
 DAVENPORT, IA 52807  
 (563) 823-0192

Modus Engineering  
 118 College St., Suite 200  
 Iowa City, IA 52240  
 TEL. (319) 348-4600

	I hereby certify that this portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly licensed Professional Architect under the laws of the State of Iowa. <b>FOR Origin Design Co.</b> 
	11/28/2023 Michael McNeil <span style="float: right;">Date</span>
	6/30/2025 <span style="float: right;">4/29/2021</span> Registration Expires <span style="float: right;">Date Issued</span>
	Pages or sheets covered by this seal: Architectural Divisions 01, 02, 06, 07, 08, 09, 10, and 12

	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa. <b>FOR Origin Design Co.</b> 
	11/28/2023 Emily Crowe, P.E. <span style="float: right;">Date</span>
	License Number 25265 My license renewal date is December 31, 2024
	Pages or sheets covered by this seal: Divisions 03, 04, 05, 06, 31

	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa. <b>FOR Modus Engineering</b> 
	11/28/2023 Kevin R. Panczyk, P.E. <span style="float: right;">Date</span>
	License Number 24714 My license renewal date is December 31, 2023
	Pages or sheets covered by this seal: Divisions 22-28



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## NOTICE TO BIDDERS

### CLINTON COUNTY CONSERVATION OFFICE REMODEL & ADDITION

Clinton County Conservation is seeking bidders to bid the contract for the office renovations at the Clinton County Conservation office, located at 2308 255<sup>th</sup> Street, Grand Mound, Iowa.

**Time and Place for Filing Sealed Proposals.** Sealed bids for the work comprising of Office Renovations to the Clinton County Conservation Office located at 2308 255<sup>th</sup> Street, Grand Mound, Iowa, as stated below must be filed before 2:00 p.m. on December 29, 2023 in the Office of the County Auditor, Clinton County Administration Building, 1900 N. 3<sup>rd</sup> St., Clinton, IA 52732.

**Time and Place Sealed Proposals will be Opened and Considered.** Sealed proposals will be opened and bids tabulated at 2:00 p.m. on December 29, 2023 at the Clinton County Administration Building, 1900 N 3<sup>rd</sup> St, Conference Room B, Clinton, Iowa, for consideration by the Clinton County Conservation Board (Board) at its next meeting in January. The Clinton County Conservation Board of Grand Mound, Iowa, reserves the right to reject any and all bids.

**Pre-bid Information:** Prospective Bidders may contact Phil Visser, Executive Director, Clinton County Conservation, Clinton County Conservation Office, 2308 255<sup>th</sup> Street, Grand Mound, Iowa 52751; office phone (563) 847-7202 or by email: [pvisser@clintoncounty-ia.gov](mailto:pvisser@clintoncounty-ia.gov). Each prospective bidder is encouraged to attend the Pre-Bid Construction Conference to be held at 10:00 AM on December 5, 2023 at the project site, 2308 255<sup>th</sup> Street, Grand Mound, Iowa. Attendance by prospective bidders is not mandatory but highly recommended.

**Time for Commencement and Completion of Work.** Work on the Building shall be commenced within ten (10) days after the Notice to Proceed has been issued and shall be completed by June 30<sup>th</sup>, 2024. The contractor shall schedule and conduct a preconstruction meeting and present a schedule showing dates and timelines for each portion of the project. The contractor shall work with the owner in scheduling construction so that the owner may use as much of the facility as possible for their operation. This schedule must be approved by the owner prior to the start of work. If the contractor cannot complete substantial completion by the scheduled date, the Contractor shall pay the County \$1,000.00 per day liquidated damages for each day substantial completion is determined by the owner & architect.

**Bid Security.** Each Bidder shall accompany its bid with a bid security as security that the successful bidder will enter into a contract for the work bid upon and will furnish after the award of contract a corporate surety bond, acceptable to the governmental entity, for the faithful performance of the contract, in an amount equal to one hundred percent (100%) of the amount of the contract. The bid security shall be in the amount of five percent (5%) of the amount of the contract and shall be in the form of a cashier's check or certified check drawn on a state-chartered or federally-chartered bank, or a certified share draft drawn on a state-chartered or federally-chartered credit union, or the governmental entity may provide for a bidder's bond with corporate surety satisfactory to the governmental entity. The bid bond shall contain no conditions except as provided in this section.

**Contract Documents.** Copies of the Construction Bidding Documents may be obtained by contacting Clinton Printing Company, 1402 Roosevelt Street, Clinton, Iowa, 52732, 563-242-7895. A deposit of \$100.00 per set of documents or receipt of AGC, AMC, AMEC, MBI or

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NECA card is required. Deposits will be refunded upon return of the Construction Bidding Documents in good condition within ten (10) days after bid opening.

Copies of the Construction Bidding Documents may be viewed at Clinton County Conservation, Clinton County Conservation Office, 2308 255<sup>th</sup> Street, Grand Mound, Iowa 52751. Project information will also be posted on the County's website at [www.clintoncounty-ia.gov](http://www.clintoncounty-ia.gov)

**Preference for Iowa Products and Labor.** By virtue of statutory authority, preference will be given to products and provisions grown and coal produced within the State of Iowa, and to Iowa domestic labor, to the extent lawfully required under Iowa statutes. Equipment or products authorized to be purchased with federal funding awarded for this contract must be American made to the maximum extent feasible, in accordance with Public Law 103-121, Sections 606 (a) and (b).

**Sales Tax.** The bidder should not include sales tax in its bid. A sales tax exemption certificate will be available for all material purchased for incorporation in the project.

**General Nature of Public Improvement.** The scope of the project includes renovations to the Clinton County Conservation Office.

**To View the Building.** Building is located at 2308 255<sup>th</sup> Street., Grand Mound, Iowa. Prospective Bidders may contact Phil Visser, Executive Director, Clinton County Conservation office, 2308 255<sup>th</sup> Street, Grand Mound, Iowa, 52751; office phone 563- 547-7202 or by email: [pvisser@clintoncounty-ia.gov](mailto:pvisser@clintoncounty-ia.gov).

For the Clinton County Conservation Board,  
Phil Visser, Director  
Clinton County Conservation Board





# AIA® Document A701® – 2018

## Instructions to Bidders

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

Clinton County Conservation Office Renovation  
2308 255<sup>th</sup> Street  
Grand Mound, IA 52751

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

Clinton County Conservation  
2308 255<sup>th</sup> Street / PO Box 68  
Grand Mound, IA 52751

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

Origin Design Co.  
5405 Utica Ridge Road, #200  
Davenport, IA 52742

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- 5      **CONSIDERATION OF BIDS**
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- 7      **PERFORMANCE BOND AND PAYMENT BOND**
- 8      **ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS**

### ADDITIONS AND DELETIONS:

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

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

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

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

## ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

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

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

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

## ARTICLE 2 BIDDER'S REPRESENTATIONS

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

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

## ARTICLE 3 BIDDING DOCUMENTS

### § 3.1 Distribution

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

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

which in no case shall exceed One Hundred Fifty Dollars (\$150.00). Deposit checks shall be made out to: Clinton County Conservation Board.

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the Bidding Documents in reusable condition within fourteen (14) days after award of the Project. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

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

*(Paragraph deleted)*

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

### § 3.2 Modification or Interpretation of Bidding Documents

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

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven (7) days prior to the date for receipt of Bids.

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

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

§ 3.2.4 In the case of errors, inconsistencies, or ambiguities in the Bidding Documents not interpreted or clarified by addendum or discovered too late for an addendum, the following applies:

- .1 The better quality or greater quantity of Work shall be provided.
- .2 To the best of their ability, the Bidders shall determine the proper methods or materials required to fulfill the design intent of the Bidding Documents and include the cost of providing such methods or materials in the Bid. Submit as supplemental information, attached to the Bid, explaining the methods or materials included in the Bid.
- .3 Failure to request clarification will not waive the responsibility of comprehension of the documents and performance of the work in accordance with the intent of the documents. Signing of the Agreement will be considered as thorough comprehension of intent of the Bidding Documents.

### § 3.3 Substitutions

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

#### § 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten (10) days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a "Substitution Request (During the bidding phase) Form" included in the Project Specification Manual. Refer to Section 012500 'Substitution Procedures' for procedural requirements. All substitution requests submitted must be complete with all requested information. Incomplete forms and requests submitted on other forms will not be considered.

- .1 Bidders and sub-bidders may propose substitutions unless the specification indicates otherwise.

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

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

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

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

#### § 3.4 Addenda

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

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

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

§ 3.4.3 Addenda will be issued no later than two (2) days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

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

### ARTICLE 4 BIDDING PROCEDURES

#### § 4.1 Preparation of Bids

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

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

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

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

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

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

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

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

**§ 4.2 Bid Security**

**§ 4.2.1** Each Bid shall be accompanied by the following bid security:  
*(Insert the form and amount of bid security.)*

A certified check, cashier's check, certified share draft or bid bond in the amount equal to five percent (5%) OF THE AMOUNT OF THE BID AS GUARANTEE THAT THE Bidder will furnish a one hundred percent (100%) Performance Bond and a Labor and Material Payment Bond, and within ten (10) days after the date of award will enter into a Contract with the Owner in accordance with the terms of the Bid. Bid Security shall be made payable to Clinton County Conservation.

**§ 4.2.2** The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

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

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

**§ 4.3 Submission of Bids**

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

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

Submit Bids and Bid Security in opaque, sealed envelope. Refer to Bidding Requirements outlined in project 'Advertisement for Bids or Notice to Bidders' documents.

Address Bids to:

Phil Visser – Executive Director  
Clinton County Conservation  
2308 255<sup>th</sup> Street / PO Box 68  
Grand Mound, IA 52751

Mailed Bids:

Send to address indicated above

Hand Delivered Bids:

Deliver to address indicated above

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

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

**§ 4.3.4** The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids. Owner shall not be responsible for postal delivery issues or internal delivery of mail.

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted. Oral, telephonic facsimile or other electronically transmitted bids will not be considered.

§ 4.3.5 Bidders are hereby given notice to check carefully the accuracy and arithmetic of their bids before submission. Errors in bids **may** result in rejection of that bid and award to the next low bidder.

#### § 4.4 Modification or Withdrawal of Bid

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

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

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

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

### ARTICLE 5 CONSIDERATION OF BIDS

#### § 5.1 Opening of Bids

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

#### § 5.2 Rejection of Bids

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

#### § 5.3 Acceptance of Bid (Award)

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

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

### ARTICLE 6 POST-BID INFORMATION

#### § 6.1 Contractor's Qualification Statement

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

#### § 6.2 Owner's Financial Capability

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen (14) days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids.

Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

### **§ 6.3 Submittals**

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

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

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

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

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

## **ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND**

### **§ 7.1 Bond Requirements**

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

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

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

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

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

### **§ 7.2 Time of Delivery and Form of Bonds**

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

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

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

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

**ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS**

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

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.  
*(Insert the complete AIA Document number, including year, and Document title.)*

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.  
*(Insert the complete AIA Document number, including year, and Document title.)*

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.  
*(Insert the complete AIA Document number, including year, and Document title.)*

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:  
*(Insert the date of the E203-2013.)*

.5 Drawings

Number	Title	Date
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.6 Specifications

Section	Title	Date	Pages
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.7 Addenda:

Number	Date	Pages
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.8 Other Exhibits:

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

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

The Sustainability Plan:

Title	Date	Pages
-------	------	-------



[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
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.9 Other documents listed below:  
*(List here any additional documents that are intended to form part of the Proposed Contract Documents.)*





## **DOCUMENT 002213 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS**

The following supplements modify AIA Document A701, 1997 Edition, "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 remain in effect.

### **ARTICLE 2 BIDDER'S REPRESENTATIONS**

Add the following Clause 2.1.3.1 to 2.1.3:

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 (refer to AIA Document 201, Article 2).

Add the following sub-paragraph 2.1.5 and associated Clauses to 2.1:

2.1.5 Bidders are to be aware of and comply with the governing rules, laws and regulations, tax laws, registration and bonding requirements that apply to the state where the Project is located, and meets qualifications indicated in the Procurement and Contracting Documents. The Owner and Architect are not implying the web sites contain all the information required.

- .1 The Bidder complies with the laws and regulations of "Iowa's Contractor Law – Registration and Bonding" (refer to <http://www.iowaworkforce.org/labor/contractor.htm>).
- .2 The Bidder complies with the City of DeWitt, Iowa construction contracting requirements.
- .3 The Owner is a designated exempt entity and the Project is exempt from Iowa Sales Tax. The Owner will issue tax exemption certificates.

Add the following sub-paragraph 2.1.6 to 2.1:

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.

### **ARTICLE 3 BIDDING DOCUMENTS**

#### **3.1 COPIES**

Add the following Clauses 3.1.1.1, 3.1.1.2, and 3.1.1.3 to 3.1.1:

3.1.1.1 Each Bidder will be allowed to retain the Bidding Documents until the Contract has been awarded, or until the Bidder is definitely out of the competition, whereupon the Bidding Documents shall be returned to the place where the documents were issued from.

3.1.1.2 The Bidder's deposit, if any, shall be forfeited if the Bidding Documents are not returned.

3.1.1.3 If a Bidder requests Bidding Documents as a preliminary to the bidding of a Project, but later decides not to Bid, return Bidding Documents to location where issued from without delay.

### 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

3.2.2 Modify the sentence to read “Bidders and ...shall make written or verbal requests which ....receipt of Bids.”

Add the following sub-paragraph 3.2.4 and associated Clauses to 3.2:

3.2.4 In the case of errors, inconsistencies, or ambiguities in the Bidding Documents not interpreted or clarified by addendum or discovered too late for an addendum, the following applies:

- .1 The better quality or greater quantity of Work shall be provided.
- .2 To the best of their ability, the Bidders shall determine the proper methods or materials required to fulfill the design intent of the Bidding Documents and include the cost of providing such methods or materials in the Bid. Submit as supplemental information, attached to the Bid, explaining the methods or materials included in the Bid.
- .3 Failure to request clarification will not waive the responsibility of comprehension of the documents and performance of the work in accordance with the intent of the documents. Signing of the Agreement will be considered as thorough comprehension of intent of the Bidding Documents.

### 3.3 SUBSTITUTIONS

Add the following Clause 3.3.2.1 to 3.3.2:

3.3.2.1 Submit substitution requests on the “Substitution Request Form” included in the Project Specification Manual. Refer to Section 012500 “Substitution Procedures” for procedural requirements. All substitution requests submitted must be complete with all requested information. Incomplete forms and requests submitted on other forms will not be considered.

- .1 Bidders and sub-bidders may propose substitutions unless the specification indicates otherwise. See Section 012500 – Substitution Procedures.

### 3.4 ADDENDA

Add the following sub-subparagraph 3.4.5 to 3.4:

3.4.5 An extra Bid Form will be sent along with addendum for the Bidder's use, and the Bidder may also, if so desired, remove the Bid Form bound in these specifications.

## ARTICLE 4 BIDDING PROCEDURES

### 4.2 BID SECURITY

Add the following Clause 4.2.1.1 to 4.2.1:

4.2.1.1 Bid security shall be in the amount of five percent (5%) of the Bid sum.

Add the following Clause 4.2.2.1 to 4.2.2:

4.2.2.1 In-lieu-of an AIA Document A310, Bid Bond, the required bid security may be cashier's check or certified check drawn on a state-chartered or federally chartered bank, or a certified share draft drawn on a state-chartered or federally chartered credit union, made payable to the Owner.

Add the following Clause 4.2.3.1 to 4.2.3:

4.2.3.1 The Owner will retain the bid security furnished by the successful Bidder until the approved contract form has been executed, a bond has been filed by the Bidder guaranteeing the performance of the contract, and the contract and bond have been approved by the Owner. The Owner will promptly return the checks or Bidder's bonds of unsuccessful Bidders to the Bidders as soon as the successful Bidder is determined or within thirty days, whichever is sooner. If the successful Bidder refuses to enter into Agreement, the bid security will be retained as liquidated damages, but not as a penalty.

#### 4.3 SUBMISSION OF BIDS

Replace 4.3.1 with the following:

4.3.1. Submit bid security and any other documents in a separate, sealed, envelope from the Bid Form in order to inspect the bid security without exposing the Bid. Use envelopes with company's business return address. Clearly mark the outside of both envelopes with the Project title, list of contents, and, if applicable, the designated portion of the Work for which the Bid is submitted. Enclose both envelopes into a large vanilla mailing envelope, addressed to the party receiving the Bids, the Bidder's return address, the name of the Project, and with the notation "SEALED BID AND SEALED BID SECURITY ENCLOSED" on the face of the envelope.

1. No responsibility shall be attached to the Owner, authorized representative of Owner, any employee of the Owner, and Architect for the premature opening of any bid not properly addressed and identified.

Add the following sentence at the end of 4.3.3:

Bids shall be mailed or hand delivered to the party receiving the Bids so as to reach their destination prior to the date and time set for Bidding. All Bids will be time and date stamped upon receipt. The official clock used to determine the Bid letting time will be located in the office receiving Bids.

### ARTICLE 5 CONSIDERATION OF BIDS

#### 5.2 REJECTION OF BIDS

Add 5.2.1 at the beginning of the sub-paragraph.

Add sentence at the end of

5.2.1: Rejected Bids will be  
returned unopened.

#### 5.3 ACCEPTANCE OF BID (AWARD)

Modify 5.3.1 as follows:

5.3.1 Change the words "lowest qualified" to "lowest responsive, responsible".

5.3.1 Delete the last sentence "The Owner shall have the right to waive.....the Owner's own best interest."

Add the following Clause 5.3.1.1 to 5.3.1:

5.3.1.1 The price(s) of each Bid will be kept firm for a period of thirty (30) days.

## ARTICLE 6 POST-BID INFORMATION

### 6.1 CONTRACTOR'S QUALIFICATION STATEMENT

Add 6.1.1 at the beginning of the sub-paragraph.

Add the following Clauses 6.1.1.1, 6.1.1.2, 6.1.1.3, and 6.1.1.4 to sub-paragraph 6.1.1:

- 6.1.1.1 The lowest Bidder shall complete and fully disclose all information requested in the AIA Document A305 and submit the completed Document within 48 hours. Failure to submit the information may preclude the Bid from further consideration by the Owner.
- 6.1.1.2 The Owner may make such investigations as deemed necessary to determine the ability and qualification of the Bidder.
- 6.1.1.3 No Bid will be accepted from a Bidder who is engaged on any work which would impair their ability to perform or finance this work or other work in progress.
- 6.1.1.4 The Owner reserves the right to reject any Bid if the Owner determines, in its sole and absolute discretion, that the Bidder is not properly qualified to carry out the obligations of the Contract and/or to complete the work contemplated by the contract. Conditional bids will not be accepted.

## ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

### 7.1 BOND REQUIREMENTS

Delete the first sentence of 7.1.1 and replace with the following:

7.1.1 The successful Bidder shall furnish bonds covering the faithful performance of the Contract and the payment of all obligations arising there under.

### 7.2 TIME OF DELIVERY AND FORM OF BONDS

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

7.2.1 Submit bonds, in duplicate, together with the executed Owner-Contractor Agreement.

## ARTICLE 9 EXECUTION OF THE CONTRACT

Add Article 9:

9.1.1 Subsequent to the Notice of Intent to Award, and within ten (10) days after the prescribed Form of Agreement is presented to the Awardee for signature, the Awardee shall execute and deliver the Agreement and Certificate of Insurance to Owner through the Architect, in such number of counterparts as Owner may require.

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.

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.

9.1.4 In the event of a default, Owner may declare the amount of the bid security forfeited

Clinton County Conservation  
Office Remodel & Addition

DeWitt, IA

and elect to either award the Contract to the next lowest responsive, responsible Bidder or re-advertise for Bids.

END OF DOCUMENT 002213





**DOCUMENT 004113 - BID FORM – STIPULATED SUM (SINGLE-PRIME CONTRACT)**

PROJECT: Clinton County Conservation Office Remodel & Addition  
Grand Mound, Iowa

BIDDER: \_\_\_\_\_  
(Company Name) (Bid Date)

**A. ACKNOWLEDGEMENT OF ADDENDA**

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

BIDDER has received the following Addenda receipt of which is hereby

acknowledged, Addendum No. \_\_\_ through No. \_\_\_\_\_

**B. CERTIFICATIONS AND BASE BID**

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, and 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 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:

Lump-Sum Price \_\_\_\_\_  
\_\_\_\_\_ (\$ \_\_\_\_\_ )  
(words) (figures)

**C. ALTERNATES**

(Bidder Note: For each alternate, place a check next to "Add" or "Deduct" or "No Change" that is applicable to the alternate)

Alternate No. 1 – Provide a cost to eliminate the Storm Shelter in its entirety.

Add \_\_\_ Deduct \_\_\_ No Change \_\_\_

\_\_\_\_\_  
\_\_\_\_\_ (\$ \_\_\_\_\_ )  
(words) (figures)

D. UNIT PRICES

1. None

E. TIME OF COMPLETION

The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect and shall fully complete the Work within the number of calendar days indicated below.

Indicate the approximate number of calendar days needed to complete the work.

---

F. ATTACHMENTS

The following documents are attached to and made a condition of this

Bid: Bid Security - Submitted in separate envelope

SUBMITTED By \_\_\_\_\_  
(Company Name)

\_\_\_\_\_  
(Signature of Authorized Person)

\_\_\_\_\_  
(Printed Name of Authorized Person) (Title)

\_\_\_\_\_  
(Business Address)

\_\_\_\_\_  
(City) (State) (Zip Code)

\_\_\_\_\_  
(Telephone Number) (Fax Number)

\_\_\_\_\_  
(Iowa Contractor License Number)

END OF DOCUMENT 004113

# Bidder Status Form

## To be completed by all bidders

## Part A

Please answer "Yes" or "No" for each of the following:

- Yes  No My company is authorized to transact business in Iowa.  
*(To help you determine if your company is authorized, please review the worksheet on the next page).*
- Yes  No My company has an office to transact business in Iowa.
- Yes  No My company's office in Iowa is suitable for more than receiving mail, telephone calls, and e-mail.
- Yes  No My company has been conducting business in Iowa for at least 3 years prior to the first request for bids on this project.
- Yes  No My company is not a subsidiary of another business entity or my company is a subsidiary of another business entity that would qualify as a resident bidder in Iowa.

If you answered "Yes" for each question above, your company qualifies as a resident bidder. Please complete Parts B and D of this form.

If you answered "No" to one or more questions above, your company is a nonresident bidder. Please complete Parts C and D of this form.

## To be completed by resident bidders

## Part B

My company has maintained offices in Iowa during the past 3 years at the following addresses:

Dates: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ to \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ Address: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_

Dates: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ to \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ Address: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_

Dates: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ to \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ Address: \_\_\_\_\_

*You may attach additional sheet(s) if needed.* City, State, Zip: \_\_\_\_\_

## To be completed by non-resident bidders

## Part C

1. Name of home state or foreign country reported to the Iowa Secretary of State:

2. Does your company's home state or foreign country offer preferences to resident bidders, resident labor force preferences or any other type of preference to bidders or laborers?  Yes  No

3. If you answered "Yes" to question 2, identify each preference offered by your company's home state or foreign country and the appropriate legal citation.

*You may attach additional sheet(s) if needed.*

## To be completed by all bidders

## Part D

I certify that the statements made on this document are true and complete to the best of my knowledge and I know that my failure to provide accurate and truthful information may be a reason to reject my bid.

Firm Name: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**You must submit the completed form to the governmental body requesting bids per 875 Iowa Administrative Code Chapter 156. This form has been approved by the Iowa Labor Commissioner.**

## Worksheet: Authorization to Transact Business

This worksheet may be used to help complete Part A of the Resident Bidder Status form. If at least one of the following describes your business, you are authorized to transact business in Iowa.

- Yes  No      My business is currently registered as a contractor with the Iowa Division of Labor.
- Yes  No      My business is a sole proprietorship and I am an Iowa resident for Iowa income tax purposes.
- Yes  No      My business is a general partnership or joint venture. More than 50 percent of the general partners or joint venture parties are residents of Iowa for Iowa income tax purposes.
- Yes  No      My business is an active corporation with the Iowa Secretary of State and has paid all fees required by the Secretary of State, has filed its most recent biennial report, and has not filed articles of dissolution.
- Yes  No      My business is a corporation whose articles of incorporation are filed in a state other than Iowa, the corporation has received a certificate of authority from the Iowa secretary of state, has filed its most recent biennial report with the secretary of state, and has neither received a certificate of withdrawal from the secretary of state nor had its authority revoked.
- Yes  No      My business is a limited liability partnership which has filed a statement of qualification in this state and the statement has not been canceled.
- Yes  No      My business is a limited liability partnership which has filed a statement of qualification in a state other than Iowa, has filed a statement of foreign qualification in Iowa and a statement of cancellation has not been filed.
- Yes  No      My business is a limited partnership or limited liability limited partnership which has filed a certificate of limited partnership in this state, and has not filed a statement of termination.
- Yes  No      My business is a limited partnership or a limited liability limited partnership whose certificate of limited partnership is filed in a state other than Iowa, the limited partnership or limited liability limited partnership has received notification from the Iowa secretary of state that the application for certificate of authority has been approved and no notice of cancellation has been filed by the limited partnership or the limited liability limited partnership.
- Yes  No      My business is a limited liability company whose certificate of organization is filed in Iowa and has not filed a statement of termination.
- Yes  No      My business is a limited liability company whose certificate of organization is filed in a state other than Iowa, has received a certificate of authority to transact business in Iowa and the certificate has not been revoked or canceled.

 **AIA<sup>®</sup> 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)***BOND AMOUNT: \$****PROJECT:***(Name, location or address, and Project number, if any)*

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

**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.





# AIA® Document A101® – 2017

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

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

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

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

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

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

The Owner and Contractor agree as follows.

### ADDITIONS AND DELETIONS:

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

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

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

Init.

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## TABLE OF ARTICLES

1	THE CONTRACT DOCUMENTS
2	THE WORK OF THIS CONTRACT
3	DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
4	CONTRACT SUM
5	PAYMENTS
6	DISPUTE RESOLUTION
7	TERMINATION OR SUSPENSION
8	MISCELLANEOUS PROVISIONS
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### EXHIBIT A INSURANCE AND BONDS

#### ARTICLE 1 THE CONTRACT DOCUMENTS

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

#### ARTICLE 2 THE WORK OF THIS CONTRACT

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

#### ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

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

*(Check one of the following boxes.)*

- The date of this Agreement.
- A date set forth in a notice to proceed issued by the Owner.
- Established as follows:  
*(Insert a date or a means to determine the date of commencement of the Work.)*

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

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

#### § 3.3 Substantial Completion

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

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



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

[ ] By the following date:

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

**Portion of Work**

**Substantial Completion Date**

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

#### ARTICLE 4 CONTRACT SUM

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

#### § 4.2 Alternates

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

**Item**

**Price**

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

**Item**

**Price**

**Conditions for Acceptance**

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

**Item**

**Price**

#### § 4.4 Unit prices, if any:

*(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)*

**Item**

**Units and Limitations**

**Price per Unit (\$0.00)**

#### § 4.5 Liquidated damages, if any:

*(Insert terms and conditions for liquidated damages, if any.)*

#### § 4.6 Other:

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

## ARTICLE 5 PAYMENTS

### § 5.1 Progress Payments

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

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

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment. *(Federal, state or local laws may require payment within a certain period of time.)*

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

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

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

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

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

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

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

### § 5.1.7 Retainage

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

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

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

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

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

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

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

## § 5.2 Final Payment

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

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

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

## § 5.3 Interest

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

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

%

## ARTICLE 6 DISPUTE RESOLUTION

### § 6.1 Initial Decision Maker

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

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

## § 6.2 Binding Dispute Resolution

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

*(Check the appropriate box.)*

- Arbitration pursuant to Section 15.4 of AIA Document A201–2017
- Litigation in a court of competent jurisdiction
- Other *(Specify)*

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

## ARTICLE 7 TERMINATION OR SUSPENSION

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

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

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

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

## ARTICLE 8 MISCELLANEOUS PROVISIONS

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

§ 8.2 The Owner’s representative:

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

§ 8.3 The Contractor’s representative:

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

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

**§ 8.5 Insurance and Bonds**

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

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

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

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

§ 8.7 Other provisions:

**ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS**

§ 9.1 This Agreement is comprised of the following documents:

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

.5 Drawings

Number	Title	Date
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.6 Specifications

Section	Title	Date	Pages
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.7 Addenda, if any:

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

.8 Other Exhibits:

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

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

[ ] The Sustainability Plan:

Title	Date	Pages
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[ ] Supplementary and other Conditions of the Contract:

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

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

\_\_\_\_\_  
**OWNER** (Signature)

\_\_\_\_\_  
(Printed name and title)

\_\_\_\_\_  
**CONTRACTOR** (Signature)

\_\_\_\_\_  
(Printed name and title)



**AIA**<sup>®</sup>

# Document A312<sup>®</sup> – 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)*

**BOND**

Date:

*(Not earlier than Construction Contract Date)*

Amount: \$

Modifications to this Bond:  None  See Section 18

**CONTRACTOR AS PRINCIPAL**

Company: *(Corporate Seal)*

**SURETY**

Company: *(Corporate Seal)*

Signature: \_\_\_\_\_

Name and

Title:

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

Signature: \_\_\_\_\_

Name and

Title:

*(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.

§ 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.



§ 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.

§ 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**

Company: \_\_\_\_\_ (Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title: \_\_\_\_\_  
Address: \_\_\_\_\_

**SURETY**

Company: \_\_\_\_\_ (Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title: \_\_\_\_\_  
Address: \_\_\_\_\_



**AIA**<sup>®</sup>

# Document A312<sup>®</sup> – 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)*

**BOND**

Date:

*(Not earlier than Construction Contract Date)*

Amount: \$

Modifications to this Bond:  None  See Section 16

**CONTRACTOR AS PRINCIPAL**

Company: *(Corporate Seal)*

Signature: \_\_\_\_\_

Name and

Title:

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

**SURETY**

Company: *(Corporate Seal)*

Signature: \_\_\_\_\_

Name and

Title:

*(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.

§ 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.

§ 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.

§ 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**

Company: \_\_\_\_\_  
*(Corporate Seal)*

Signature: \_\_\_\_\_

Name and Title: \_\_\_\_\_

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

**SURETY**

Company: \_\_\_\_\_  
*(Corporate Seal)*

Signature: \_\_\_\_\_

Name and Title: \_\_\_\_\_

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





# AIA® Document A201® – 2007

## General Conditions of the Contract for Construction

**for the following PROJECT:**

*(Name and location or address)*

Clinton County Conservation Office Remodel & Addition  
Grand Mound, Iowa

**THE OWNER:**

*(Name, legal status and address)*

Clinton County Conservation  
2308 255<sup>th</sup> Street/ PO Box 68  
Grand Mound, IA 52751

**THE ARCHITECT:**

*(Name, legal status and address)*

Origin Design Co.  
5405 Utica Ridge Road, #200  
Davenport, IA 52807

**TABLE OF ARTICLES**

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- 2      **OWNER**
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- 5      **SUBCONTRACTORS**
- 6      **CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**
- 7      **CHANGES IN THE WORK**
- 8      **TIME**
- 9      **PAYMENTS AND COMPLETION**
- 10     **PROTECTION OF PERSONS AND PROPERTY**
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- 12     **UNCOVERING AND CORRECTION OF WORK**
- 13     **MISCELLANEOUS PROVISIONS**
- 14     **TERMINATION OR SUSPENSION OF THE CONTRACT**
- 15     **CLAIMS AND DISPUTES**

**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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**User Notes:**

(912878437)

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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.

§ 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 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.

## **§ 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 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 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.

### **§ 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 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.

### **§ 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.

### **§ 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.

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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.

§ 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 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 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
- .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.

### 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.

**§ 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;
- .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 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.

### § 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
- .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 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 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.

**§ 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.

§ 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 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.

**§ 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;
- .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.

## **§ 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.

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## **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.

**§ 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.

§ 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 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.

**DOCUMENT 007300 – SUPPLEMENTARY CONDITIONS**

**SUPPLEMENTARY CONDITIONS - PURPOSE**

The following supplements modify the “General Conditions of the Contract for Construction”, AIA Document A201, 2007. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions remain in effect.

**ARTICLE 2 OWNER**

**2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER**

Add the following Clause 2.2.3.1 to 2.2.3:

2.2.3.1 The Contractor shall compare information furnished by the Owner (including surveys and soil tests with observable physical conditions) and the Contract Documents and on the basis of such review, shall report to the Owner and Architect any conflicts, errors or omissions.

**ARTICLE 3 CONTRACTOR**

**3.6 TAXES**

Delete Paragraph and substitute the following:

The Contractor shall comply with Article 2 in Document 002213 “Supplementary Instructions to Bidders.”

**ARTICLE 5 SUBCONTRACTORS**

**5.3 SUBCONTRACTUAL RELATIONS**

Add the following Subparagraph 5.3.2 to 5.3:

5.3.2 If a Contractor, Subcontractor or Sub-Subcontractor solicits the services of another Contractor, Subcontractor or Sub-Subcontractor, the party hired to do the work becomes a Subcontractor subject to provisions of the Contract Documents pertaining to Subcontractors and Sub-Subcontractors as applicable. If applicable to the state where the Project is located, contractors are required to comply with state and city licensing regulations to perform work on the Project.

**ARTICLE 7 CHANGES IN THE WORK**

**7.3 CONSTRUCTION CHANGE DIRECTIVES**

7.3.6 In the first sentence, delete the words “a reasonable allowance for overhead and profit” and insert the words “an allowance for overhead and profit as set forth in Section 012600 “Contract Modification Procedures.”

**ARTICLE 9 PAYMENTS AND COMPLETION**

**9.10 FINAL COMPLETION AND FINAL PAYMENT**

Paragraph 9.10.1; modify the first sentence as follows:

9.10.1 “Upon receipt .....such inspection and, when the Owner and Architect finds the Work acceptable

.....is due and payable.” Add the following Clause 9.10.1.1 to 9.10.1:

9.10.1.1 The Contractor shall maintain the bond or bonds required by the Contract as required by law and at least until sixty (60) days after the Owner declares acceptance of the work of the Contractor and declares final acceptance of the Project. This addendum shall not in any manner relieve the bonding company of any obligations under the bond issued to the Contractor.

Add the following Clauses 9.10.2.1, 9.10.2.2, 9.10.2.3, and 9.10.2.4 to 9.10.2:

9.10.2.1 The affidavit referred to in G.C. 9.10.2(1) shall be on AIA Document G706.

9.10.2.2 Consent of Surety referred to in G.C. 9.10.2(4) shall be on AIA Document G707.

9.10.2.3 The affidavit referred to in G.C. 9.10.2(5) shall be on AIA Document G706A, if required by Owner.

9.10.2.4 AIA Forms referenced herein are available from the following addresses:

- .1 The American Institute of Architects, 1735 New York Avenue, N.W., Washington, D.C. 20006.

## **ARTICLE 11 INSURANCE AND BONDS**

### **11.1 CONTRACTOR'S LIABILITY INSURANCE**

Refer to Document 007316 "Insurance Requirements."

## **ARTICLE 12 UNCOVERING AND CORRECTION OF WORK**

### **12.3 ACCEPTANCE OF NON-CONFORMING WORK**

Delete "as appropriate and equitable" from the sentence and replace with "the entire cost of replacing the work as intended in the Contract Documents."

## **ARTICLE 15 CLAIMS AND DISPUTES**

### **15.1.5 CLAIMS FOR ADDITIONAL TIME**

Add the following Clauses 15.1.5.3 and 15.1.5.4 to 15.1.5:

15.1.5.3 Contractor's written claims for extension of time shall be accompanied by certified copies of records of dates, correspondence, notices, and other relevant information which will serve as proof of the events forming the basis for the claim.

15.1.5.4 Claims for additional time based on delayed shop drawing submittals, delayed material ordering and subsequent delays in shipping or other delays which could have been avoided by vigorous and timely prosecution of the work will not be considered as a valid basis for granting an extension of time.

### **15.4 ARBITRATION**

15.4 Delete entirely and other locations in "General Conditions of the Contract for Construction", AIA Document A201, 2007.

Add new ARTICLE 16 as follows:

**ARTICLE 16 NON-DISCRIMINATORY EMPLOYMENT**

**16.1 EQUAL OPPORTUNITY**

16.1.1 The Contractor and all Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, or age. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated equally during employment without regard to their race, religion, color, sex, national origin, or age. Actions include, but are not limited to, the following:

16.1.1.1 Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post notices setting forth the policies of non-discrimination in conspicuous places, available to employees and applicants for employment.

16.1.2 The Contractor and all Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex, national origin, or age.

END OF DOCUMENT 007300





## INSURANCE REQUIREMENTS

- C. Except for workers compensation insurance, the Contractor shall purchase and maintain such insurance as will protect the Contractor and the Jurisdiction as set forth below, which may arise out of or result from the Contractor's operations under the contract, whether such operations be by the Contractor, its subcontractors or consultants, suppliers, third parties, or the agents, officers, or employees of any of them. In addition, the Contractor shall purchase and maintain workers compensation insurance to cover its employees.
1. The Contractor will indemnify and hold harmless the Owner, its elected and appointed officers, its employees, and the Engineer and its employees from any and all claims, demands, actions or cause of action arising or resulting directly or indirectly from the action or work of the Contractor hereunder, or its Subcontractors. For the purposes of insurance, including additional insured status and any other endorsement or coverage that extends coverage to the Owner and or the Engineer, the reference to Owner shall include its elected and appointed officials and employees, and reference to Engineer shall include its employees.
  2. Contractor further agrees to provide the Engineer with certificates of insurance, confirming the Contractor and its Subcontractors have met the insurance requirements under this agreement.
  3. Contractor's Insurance: The Contractor shall not commence work under this contract until it has obtained all insurance coverage and limits required in this agreement. Certificates of insurance countersigned by an authorized licensed agent, shall be filed with the Engineer for approval. The Contractor shall not allow any of its subcontractors to commence work until all similar insurance required has been obtained by its subcontractors, or unless otherwise approved by the Owner. In absence of specific regulations, the coverage and limits shall not be less than those specified in this agreement. The minimum limits and coverage specified shall in no way limit or restrict the Contractor's indemnification or other obligations to the Owner or Engineer stated in this agreement. Upon Owner's request, Contractor and or its subcontractors shall provide copies of any or all insurance policy forms and endorsements.
    - A) Workers Compensation Insurance: Before any work is commenced, the Contractor shall take out and maintain during the life of this contract, Workers Compensation Insurance including Employers Liability Insurance for all of their employees employed at the site of the project. In case any work is sublet, the Contractor shall require its subcontractors to similarly provide Workers Compensation Insurance and Employers Liability Insurance for all of the latter's employees. This insurance shall conform to the requirements of the state where the project is located. The policy shall be written with endorsements and limits not less than the following:
      - 1) Employers Liability

Bodily Injury Each Accident	\$500,000
Bodily Injury by Disease Each Employee	\$500,000
Bodily Injury by Disease Policy Limit	\$500,000
      - 2) Endorsement WC 0003 13 - "Waiver of Our Right to Recover From Others Endorsement," in favor of the Owner.
      - 3) If applicable, Contractor shall be required to carry coverage to comply with the Longshore and Harbor Workers Act.
    - B) Commercial General Liability Insurance: The Contractor shall purchase and maintain as required under this agreement Commercial General Liability Insurance using ISO (Insurance Service Office) policy form CG 0001 or equivalent policy form approved by the Owner. Said policy may not include any policy provision or endorsement limiting or excluding coverage for work performed by subcontractors hired by Contractor. In absence of specific regulations, the coverage and limits

Clinton County Conservation  
Office Remodel & Addition

shall not be less than the following:

- 1) Commercial General Liability Limits

Limit Each Occurrence	\$1,000,000
General Aggregate Limit	\$2,000,000
Products - Completed Operations Aggregate Limit	\$2,000,000
Personal & Advertising Injury Limit	\$1,000,000
  
- 2) ISO Endorsements CG 20 10 07 04 (Additional Insured - Owners, Lessees or Contractors - Scheduled Person or Organization" **and** CG 20 37 07 04 "Additional Insured - Owners, Lessees or Contractors - Completed Operations" or equivalent endorsement(s) approved by Owner, naming Owner and Engineer as an additional insured on a primary and non-contributory basis. Owner and Engineer shall remain an additional insured under endorsement CG 20 37 07 04 for a minimum of two (2) years following completion of the project.
  
- 3) ISO Endorsement CG 25 03 05 09, "Designated Construction Project(s) General Aggregate Limit" or equivalent endorsement approved by Owner.
  
- 4) ISO Endorsement CG 24 04 05 09, "Waiver of Transfer of Rights of Recovery Against Others to Us" or equivalent endorsement approved by Owner, in favor of Owner and Engineer.
  
- 5) Governmental Immunities Endorsement, with the following provisions included. Endorsement is subject to Owner approval.
  - a) Non-Waiver of Governmental Immunity
  - b) Claims Coverage (if relative to State of Iowa Code Section 670.4)
  - c) Assertion of Governmental Immunity
  - d) Non-Denial of Coverage
  - e) No Other Change in Policy
  
- C) Business Auto Liability Insurance: The Contractor shall purchase and maintain as required under this agreement Business Auto Liability Insurance using ISO (Insurance Service Office) policy form CA 0001 or equivalent policy form approved by the Owner. Said policy shall include liability coverage for hired, non-owned and all owned autos (if any). In absence of specific regulations, the coverage and limits shall not be less than the following:
  - 1) Business Auto Liability Limits

Limit Each Occurrence	\$1,000,000
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  - 2) If Contractor or its subcontractors transport fuel to or on the construction site, Contractor shall provide evidence that its Business Auto Policy has been endorsed to provide Pollution Liability coverage using ISO endorsement CA 99 55 03 06, "Pollution Liability - Broadened Coverage for Covered Autos", or an equivalent endorsement acceptable to Owner.
  
- D) Liability Insurance Covering Special Hazards - When Applicable
  - 1) If applicable or required by Owner, Contractor and Subcontractors shall purchase and maintain Railroad Protective Liability Insurance. All policies, forms, endorsements and limits shall be subject to approval by Owner.
  
  - 2) If applicable or required by Owner, Contractor and Subcontractors shall purchase and maintain Pollution Liability Insurance. All policies, forms, endorsements and limits shall be subject to approval by Owner.

- 3) If work involves blasting or underground work, Contractor may not have any exclusion limiting or eliminating such coverage from its Commercial General Liability policy.
- E) Umbrella Liability: Contractor shall purchase and maintain as required under this agreement Commercial Umbrella Liability Insurance using a policy form that provides coverage at least as broad as provided in underlying policies and endorsements required in items A, B, and C in this agreement.
- |                                   |             |
|-----------------------------------|-------------|
| 1) Umbrella Limit Each Occurrence | \$2,000,000 |
| Annual Aggregate Limit            | \$2,000,000 |
| Retention                         | \$ 10,000   |
- F) Subcontractors: Contractor shall require its Subcontractors to comply with the insurance requirements as stated in this agreement, unless approved by the Owner.
- G) Builders Risk Insurance: The Owner shall secure Builders Risk insurance for the full value of the project including materials in transit to and temporarily stored away from the construction site, to be written on a "special or open perils" policy, and include coverage for collapse, flood, earthquake, theft of materials both attached to the structure and unattached on and off the construction site. Any exclusion or limitation due to occupancy shall be removed. Said policy will include as the named insured, Owner, Contractor, All Subcontractors and Suppliers. Owner may elect the deductible of its choosing.

**Modifications:** The following modifications shall apply to the insurance requirements for this project:

1. Workers compensation insurance coverage to comply with the Longshore and Harbor Workers Act is not required (item 3, part A, number 3).
2. Railroad protective liability insurance is not required for this project (item 3, part D, number 1).
3. Pollution liability insurance is required only if the Contractor transports fuel onto or on the site using Contractor owned facilities and vehicles (item 3, part D, number 2).
4. Upon request, the Owner will consider lower limits for minor (less than 10%) subcontractors (item 3, part F).
5. Coverage for underground work and blasting (if utilized) must be included in liability policies.
6. Builders risk insurance is not required for this project.

**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.**

## **WAIVER OF GOVERNMENTAL IMMUNITY**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART  
OWNERS AND CONTRACTORS PROTECTIVE LIABILITY COVERAGE PART  
RAILROAD PROTECTIVE LIABILITY COVERAGE PART

We will waive, both in the adjustment of claims and in the defense of "suits" against the insured, any governmental immunity of the insured, unless the insured requests in writing that we not do so.

Waiver of immunity as a defense will not subject us to liability for any portion of a claim or judgment in excess of the applicable limit of insurance.

## SECTION 011000 - SUMMARY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 PROJECT INFORMATION

- A. Project Identification: Clinton County Conservation Office – Remodel & Addition.
  - 1. Project Location: 2308 255<sup>th</sup> Street, Grand Mound, IA 52751.
- B. Owner: Clinton County, Iowa
  - 1. Owner's Representative: Phil Visser, Executive Director, Clinton County Conservation Board.
- C. Architect & Structural Engineering: Origin Design, 5405 Utica Ridge Rd. Suite 200, Davenport, IA 52807
- D. Architect's Consultant: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents.
  - 1. MODUS, 118 E. College St. Iowa City, IA 52240

#### 1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:

The project consists of a remodel & addition to the existing conservation office.

The existing 2,075 SF first floor office will be remodeled and reconfigured to provide will provide new office spaces for personnel, a conference room, break room & Kitchenette, new handicapped accessible restrooms, a new laundry area, and a foyer and reception area for visitors. All areas to receive new finishes. The plans will also include a 180 SF addition to be used as a storm shelter. The project will also include upgrades to the existing plumbing, electrical, and HVAC systems.

- B. Type of Contract:

- 1. Project will be constructed under a single prime contract.

#### 1.4 ACCESS TO SITE

- A. General: Contractor 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.
- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
  - 1. Limits: Confine construction operations to areas indicated on the documents for building demolition and new construction.
  - 2. The general contractor shall work with the building owner to allow the owner to function under normal operations.
  - 3. Construction vehicle parking will be available on-site. Parking areas will need to be coordinated with the Conservation Office so that construction vehicles will not interfere with the functions of the Conservation Office.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weather tight condition throughout construction period. Repair damage caused by construction operations.

#### 1.5 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSI/CSC's "MasterFormat" numbering system.
  - 1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the Table of Contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
  - 2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- B. 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. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
  - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may

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be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

- a. 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.

1.6 MISCELLANEOUS PROVISIONS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000





SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.

1.3 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. 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.

1.4 PROCEDURES

- A. Coordination: Modify 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 modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. ALTERNATE #1: Provide a price to eliminate the Storm Shelter in its entirety.
- B. ALTERNATE #2:
- C. ALTERNATE #3:
- D. ALTERNATE #4:

END OF SECTION 012300

## SECTION 012500 - SUBSTITUTION PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
  - 2. Divisions 02 through 33 Sections for specific requirements and limitations for substitutions.

#### 1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

#### 1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use attached substitution request form at the end of this section.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

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- b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, which will be necessary to accommodate proposed substitution.
  - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
  - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - i. Research reports evidencing compliance with building code in effect for the Project.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within fifteen days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

## 1.5 QUALITY ASSURANCE

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

## 1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than fifteen days prior to time required for preparation and review of related submittals.
  - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Requested substitution provides sustainable design characteristics that specified product provided.
    - c. Substitution request is fully documented and properly submitted.
    - d. Requested substitution will not adversely affect Contractor's construction schedule.
    - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - f. Requested substitution is compatible with other portions of the Work.
    - g. Requested substitution has been coordinated with other portions of the Work.
    - h. Requested substitution provides specified warranty.
    - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within ten days prior to bid. Requests received after that time may be considered or rejected at discretion of Architect.
  - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied,

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Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
- b. Requested substitution does not require extensive revisions to the Contract Documents.
- c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- d. Substitution request is fully documented and properly submitted.
- e. Requested substitution will not adversely affect Contractor's construction schedule.
- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

**SUBSTITUTION REQUEST – FORM  
(After the Bidding Phase)**

Project: DeWitt Fire Station Addition/Remodel Substitution Request Number: \_\_\_\_\_

To: \_\_\_\_\_ From: \_\_\_\_\_ Date: \_\_\_\_\_

Re: \_\_\_\_\_ A/E Project Number: \_\_\_\_\_ 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 A/E

Reason for not providing specified item: \_\_\_\_\_  
\_\_\_\_\_

Similar Installation:

Project: \_\_\_\_\_ Architect: \_\_\_\_\_

Address: \_\_\_\_\_ Owner: \_\_\_\_\_

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  \_\_\_\_\_

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.

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- 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 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 013300.
- Substitution approved as noted - Make submittals in accordance with Specification Section 013300.
- Substitution rejected - Use specified materials.
- Substitution Request received too late - Use specified materials.

Signed by: \_\_\_\_\_ Date: \_\_\_\_\_

Additional Comments:  Contractor  Subcontractor  Supplier  Manufacturer  A/E  \_\_\_\_\_

\_\_\_\_\_

END OF FORM



## SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Administrative and procedural requirements for Contract modifications.
- B. Related Requirements:
  - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

#### 1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, via Clarifications. (ASI).

#### 1.4 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. Work Change Proposal Requests issued by the Architect are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within 20 days 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. Indicate additional time to be added to completion date, if any.

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- 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 the 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.
    - a. Maximum combined allowance for overhead, profit, bonds and insurance, and markup, included in the total cost to the Owner, shall be based on the following:
      - 1) Contractor: For Work performed by Contractor's own forces, 15 percent of the cost.
      - 2) Contractor: For Work performed by Subcontractor, 7.5 percent of the amount due the Subcontractor.
      - 3) For each Subcontractor or Sub-subcontractor involved: For Work performed by that Subcontractor or Sub-subcontractor's own forces, 15 percent of the cost.
      - 4) For each Subcontractor: For Work performed by his Sub-subcontractors, 7.5 percent of the amount due the Sub-subcontractor.
      - 5) To expedite verification of quotations for extras or credits, include a complete cost breakdown, with itemized labor, materials, and subcontract costs, except for proposals less than \$200.00 or for those that are so minor in scope that their propriety can be validated by inspection.
  5. Indicate additional time to be added to completion date, if any.
  6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
  7. Proposal Request Form: Use form acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, the Architect will issue a Change Order for signatures of Owner and Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

## SECTION 012900 - PAYMENT PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
  - 1. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

#### 1.3 DEFINITIONS

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

#### 1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with continuation sheets.
    - b. Submittal schedule.
    - c. Items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the 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.

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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. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
  - a. Related Specification Section or Division.
  - b. Description of the Work.
  - c. Name of subcontractor.
  - d. Name of manufacturer or fabricator.
  - e. Name of supplier.
  - f. Change Orders (numbers) that affect value.
  - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
    - 1) Labor.
    - 2) Materials.
    - 3) Equipment.
4. 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.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. 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.
  - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. 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.

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

## 1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
  1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: 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. Payment Application Times: Submit Application for Payment to Architect by the 1st of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
  1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
  1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
  2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  3. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.

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- b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
  - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- G. 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.
- H. Waivers of Mechanic's Lien: Do not apply to public projects. Refer to Master Builders of Iowa "Public Projects and Lien Waivers" and Iowa Code, Chapter 573.
- I. 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. Products list (preliminary if not final).
  5. Submittal schedule (preliminary if not final).
  6. Copies of building permits.
  7. Initial progress report.
- J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
  1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. 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, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G707, "Consent of Surety to Final Payment."
  6. Evidence that claims have been settled.
  7. Final liquidated damages settlement statement.

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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 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. Requests for Information (RFIs).
  - 4. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
  - 1. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 2. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

#### 1.3 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information from each other during construction.

#### 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.

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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.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
  2. Preparation of the schedule of values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Progress meetings.
  6. Pre-installation conferences.
  7. Project closeout activities.
  8. Startup and adjustment of systems.

#### 1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
    - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    - f. Indicate required installation sequences.

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- g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

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

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
3. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
4. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Division 01 Section "Submittal Procedures."

1.6 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 included.

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.

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10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Form included in specification.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "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 ten 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. Use CSI Log Form 13.2B or Software log with not less than the following:
1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Architect.
  4. RFI number including RFIs that were returned without action or withdrawn.
  5. RFI description.
  6. Date the RFI was submitted.

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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.

## 1.7 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Owner's Representative, and Architect, within seven days of the meeting.

- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 -days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Owner's Representative, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:
  - a. Tentative construction schedule.
  - b. Phasing.
  - c. Critical work sequencing and long-lead items.
  - d. Designation of key personnel and their duties.
  - e. Lines of communications.
  - f. Procedures for processing field decisions and Change Orders.
  - g. Procedures for RFIs.
  - h. Procedures for testing and inspecting.
  - i. Procedures for processing Applications for Payment.
  - j. Distribution of the Contract Documents.
  - k. Submittal procedures.
  - l. Sustainable design requirements.
  - m. Preparation of record documents.
  - n. Use of the premises and existing building.
  - o. Work restrictions.

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- p. Working hours.
  - q. Owner's occupancy requirements.
  - r. Responsibility for temporary facilities and controls.
  - s. Procedures for moisture and mold control.
  - t. Procedures for disruptions and shutdowns.
  - u. Construction waste management and recycling.
  - v. Parking availability.
  - w. Office, work, and storage areas.
  - x. Equipment deliveries and priorities.
  - y. First aid.
  - z. Security.
  - aa. Progress cleaning.
4. Minutes: Architect will record and distribute meeting minutes to General Contractor for distribution.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, and Owner's Representative 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 requirements.
    - k. Time schedules.
    - l. Weather limitations.
    - m. Manufacturer's written instructions.
    - n. Warranty requirements.
    - o. Compatibility of materials.
    - p. Acceptability of substrates.
    - q. Temporary facilities and controls.
    - r. Space and access limitations.
    - s. Regulations of authorities having jurisdiction.
    - t. Testing and inspecting requirements.
    - u. Installation procedures.
    - v. Coordination with other work.
    - w. Required performance results.

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- 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. Owner Progress Meetings: Conduct Owner progress meetings at biweekly intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
  - 2. Attendees: Contractor, Owner, Owner's Representative, and Architect. each subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Status of submittals.
      - 4) Deliveries.
      - 5) Off-site fabrication.
      - 6) Access.
      - 7) Site utilization.
      - 8) Temporary facilities and controls.
      - 9) Progress cleaning.
      - 10) Quality and work standards.
      - 11) Status of correction of deficient items.
      - 12) Field observations.
      - 13) Status of RFIs.
      - 14) Status of proposal requests.

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- 15) Pending changes.
  - 16) Status of Change Orders.
  - 17) Pending claims and disputes.
  - 18) Documentation of information for payment requests.
4. Minutes: General Contractor will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100



## SECTION 013300 - SUBMITTAL PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
  - 1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.

#### 1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

#### 1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
  - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

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2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
  - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
  - a. Scheduled date for first submittal.
  - b. Specification Section number and title.
  - c. Submittal category: Action; informational.
  - d. Name of subcontractor.
  - e. Description of the Work covered.
  - f. Scheduled date for Architect's final release or approval.
  - g. Scheduled date of fabrication.
  - h. Scheduled dates for purchasing.
  - i. Scheduled dates for installation.
  - j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
  1. Electronic Files: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals. The delivery and preparation of documents on electronic media will be an Additional Service paid for by the Contractor. The cost of this Additional Service will be computed in a manner that compensates Origin Design for the cost of preparing the document in the format requested by the outside party and delivering it to the party. The files on the disk will be provided "as is" without warranty of any kind, either expressed or implied. Origin Design does not warrant, guarantee, or make any representations regarding the use, or the results of the use of the files in terms of correctness, accuracy, reliability, or otherwise. The requesting contractor shall also complete the Electronic Media Transfer Agreement as prepared by Origin Design upon request from contractor.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

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3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- D. Paper Submittals: Not allowed.
- 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. The digital file name shall use the Specification Section number followed by a sequential number the submittal name and then the project identifier (e.g., 092900-01\_Gypsum Board\_Clinton Co. Conservation). Resubmittals shall include an alphabetic suffix after the sequence number (e.g., e.g., 092900-01a\_Gypsum Board\_Clinton Co. Conservation).
  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 Construction Manager.
    - e. Name of Contractor.
    - f. Name of firm or entity that prepared submittal.

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- g. Names of subcontractor, manufacturer, and supplier.
  - h. Category and type of submittal.
  - i. Submittal purpose and description.
  - j. Specification Section number and title.
  - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
  - l. Drawing number and detail references, as appropriate.
  - m. Location(s) where product is to be installed, as appropriate.
  - n. Related physical samples submitted directly.
  - o. Indication of full or partial submittal.
  - p. Transmittal number, numbered consecutively.
  - q. Submittal and transmittal distribution record.
  - r. Other necessary identification.
  - s. Remarks.
- F. Options: Identify options requiring selection by Architect.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
- 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
- 1. Submit electronic submittals via email as PDF electronic files.

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- a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  2. Action Submittals: Submit electronic submittal via email as PDF electronic files.
  3. Informational Submittals: Submit electronic submittal via email as PDF electronic files.
  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.
- 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.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.

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- 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 24 by 36 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.
    - e. Specification paragraph number and generic name of each item.
  3. 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.
- E. Coordination Drawing Submittals: Comply with requirements specified in Division 01 Section "Project Management and Coordination."
- F. Application for Payment and Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
- G. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."
- H. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."

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- I. 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.
- J. 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.
- K. 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.
- L. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- M. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- N. 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.
- O. 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.
- P. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- Q. 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.
- R. 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.

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- S. 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.
- T. 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.

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 Division 01 Section "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. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300



## SECTION 014000 - QUALITY REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Requirements:
  - 1. Divisions 02 through 33 Sections for specific test and inspection requirements.

#### 1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. 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.

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- 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.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- 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.

#### 1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.

- C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Entity responsible for performing tests and inspections.
  - 3. Description of test and inspection.
  - 4. Identification of applicable standards.
  - 5. Identification of test and inspection methods.
  - 6. Number of tests and inspections required.
  - 7. Time schedule or time span for tests and inspections.
  - 8. Requirements for obtaining samples.
  - 9. Unique characteristics of each quality-control service.

## 1.6 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 Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
  - 1. Name, address, and telephone number of technical representative making report.
  - 2. Statement on condition of substrates and their acceptability for installation of product.
  - 3. Statement that products at Project site comply with requirements.
  - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.

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5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
  2. Statement that equipment complies with requirements.
  3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  4. Statement whether conditions, products, and installation will affect warranty.
  5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

## 1.7 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.

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Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
    - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
    - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
  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.

1.8 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. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
  3. 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.
- 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. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. 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.

- F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000



## SECTION 014200 - REFERENCES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 DEFINITIONS

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

#### 1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect

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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.

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 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.

#### 1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

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1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

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

2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

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.

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1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Sanitary Facilities: Provide temporary toilets and wash facilities for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities. Use of Owner's existing drinking fountain within work area is permitted as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
  1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
    - a. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
  2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
  3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- E. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:

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- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- D. 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.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  - 3. Maintain and touchup signs so they are legible at all times.
- E. 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 Division 01 Section "Execution."
- F. 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. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
  - 1. Comply with work restrictions specified in Division 01 Section "Summary."
- C. 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.

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- D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- E. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- F. 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.
  - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- G. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by tenants from fumes and noise.
  - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
  - 2. Construct dustproof partitions with two layers of 6-mil (0.14-mm) polyethylene sheet on each side. Cover floor with two layers of 6-mil (0.14-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
    - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.
  - 3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
  - 4. Insulate partitions to control noise transmission to occupied areas.
  - 5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
  - 6. Protect air-handling equipment.
  - 7. Provide walk-off mats at each entrance through temporary partition.

### 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.

### 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.

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1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "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 through Construction Manager 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. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

- C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

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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.
  5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

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 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

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.
9. Correction of the Work.

- B. Related Requirements:

1. Division 01 Section "Summary" for limits on use of Project site.
2. Division 01 Section "Submittal Procedures" for submitting surveys.
3. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

#### 1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.5 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
  2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.
    - c. Air or smoke barriers.
    - d. Fire-suppression systems.
    - e. Mechanical systems piping and ducts.
    - f. Control systems.
    - g. Communication systems.
    - h. Fire-detection and -alarm systems.
    - i. Conveying systems.
    - j. Electrical wiring systems.
    - k. Operating systems of special construction.
  3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
    - a. Water, moisture, or vapor barriers.
    - b. Membranes and flashings.
    - c. Exterior curtain-wall construction.
    - d. Sprayed fire-resistive material.
    - e. Equipment supports.
    - f. Piping, ductwork, vessels, and equipment.
    - g. Noise- and vibration-control elements and systems.
  4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that 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.



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- B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS (Not Used)

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.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility Owner 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 Division 01 Section "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.

### 3.4 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.

### 3.5 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Division 01 Section "Summary."
- 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 Division 31 Sections where required by cutting and patching operations.
  5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  6. Proceed with patching after construction operations requiring cutting are complete.
- 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.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### 3.6 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.

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- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
  - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
  - 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

### 3.7 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.
  - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
  - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- 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.

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- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "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 017329 - CUTTING AND PATCHING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.

#### 1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

#### 1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
  - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
  - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
  - 3. Products: List products to be used and firms or entities that will perform the Work.
  - 4. Dates: Indicate when cutting and patching will be performed.
  - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
  - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
  - 7. Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

## 1.5 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety. Operating elements include the following:
  - 1. Primary operational systems and equipment.
  - 2. Fire-suppression systems.
  - 3. Mechanical systems piping and ducts.
  - 4. Control systems.
  - 5. Communication systems.
  - 6. Conveying systems.
  - 7. Electrical wiring systems.
  - 8. Operating systems of special construction in Division 13 Sections.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity that results in reducing their capacity to perform as intended, or that result in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:
  - 1. Water, moisture, or vapor barriers.
  - 2. Membranes and flashings.
  - 3. Exterior curtain-wall construction.
  - 4. Equipment supports.
  - 5. Piping, ductwork, vessels, and equipment.
  - 6. Noise- and vibration-control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces 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.

## 1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials 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 match the visual and functional performance of in-place materials.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
  1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
  2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. 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.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

### 3.3 PERFORMANCE

- A. 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. 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 as small as possible, neatly to 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.

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4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
  5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  6. Proceed with patching after construction operations requiring cutting are complete.
- C. 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 possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate 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 eliminate evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329

## SECTION 017700 - CLOSEOUT PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
- B. Related Requirements:
  - 1. Division 01 Section "Execution" for progress cleaning of Project site.
  - 2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 3. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 4. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

- 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
- 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
- 3. Submit closeout submittals specified in individual Divisions 02 through 33 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
- 4. Submit maintenance material submittals specified in individual Divisions 02 through 33 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

- a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.

- 5. Submit test/adjust/balance records.
- 6. Submit sustainable design submittals required in Division 01 sustainable design requirements Section and in individual Division 02 through 33 Sections.
- 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

- 1. Advise Owner of pending insurance changeover requirements.
- 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
- 3. Complete startup and testing of systems and equipment.

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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 Division 01 Section "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

## 1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

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1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

#### 1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first.
  2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Page number.
  4. Submit list of incomplete items in the following format:
    - a. MS Excel electronic file. Architect will return annotated file.

#### 1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch 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.

- D. 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.

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- h. Sweep concrete floors broom clean in unoccupied spaces.
  - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
  - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
  - k. Remove labels that are not permanent.
  - l. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
  - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
    - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
  - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
  - q. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

### 3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
  - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
  - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.



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- 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 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency manuals.
  - 3. Operation manuals for systems, subsystems, and equipment.
  - 4. Product maintenance manuals.
  - 5. Systems and equipment maintenance manuals.
- B. Related Requirements:
  - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
  - 2. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

#### 1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:

1. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.

## PART 2 - PRODUCTS

### 2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
  1. List of documents.
  2. List of systems.
  3. List of equipment.
  4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

### 2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  1. Title page.
  2. Table of contents.
  3. Manual contents.
- B. Title Page: Include the following information:
  1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.

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5. Name and contact information for Contractor.
  6. Name and contact information for Construction Manager.
  7. Name and contact information for Architect.
  8. Name and contact information for Commissioning Authority.
  9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
  - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
  - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
  1. Type of emergency.
  2. Emergency instructions.
  3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
  1. Fire.
  2. Flood.
  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.

## 2.4 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 has delegated design responsibility.
  3. Operating standards.
  4. Operating procedures.
  5. Operating logs.
  6. Wiring diagrams.
  7. Control diagrams.
  8. Piped system diagrams.
  9. Precautions against improper use.
  10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
  2. Manufacturer's name.
  3. Equipment identification with serial number of each component.
  4. Equipment function.
  5. Operating characteristics.
  6. Limiting conditions.
  7. Performance curves.
  8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
  2. Equipment or system break-in procedures.
  3. Routine and normal operating instructions.
  4. Regulation and control procedures.
  5. Instructions on stopping.
  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.

## 2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Color, pattern, and texture.
  - 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.
  - 1. Include procedures to follow and required notifications for warranty claims.

## 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.



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- C. **Manufacturers' Maintenance Documentation:** Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  - 1. Standard maintenance instructions and bulletins.
  - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  - 3. Identification and nomenclature of parts and components.
  - 4. List of items recommended to be stocked as spare parts.
  
- D. **Maintenance Procedures:** Include the following information and items that detail essential maintenance procedures:
  - 1. Test and inspection instructions.
  - 2. Troubleshooting guide.
  - 3. Precautions against improper maintenance.
  - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - 5. Aligning, adjusting, and checking instructions.
  - 6. Demonstration and training video recording, if available.
  
- E. **Maintenance and Service Schedules:** Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
  - 1. **Scheduled Maintenance and Service:** Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  - 2. **Maintenance and Service Record:** Include manufacturers' forms for recording maintenance.
  
- F. **Spare Parts List and Source Information:** Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
  
- G. **Maintenance Service Contracts:** Include copies of maintenance agreements with name and telephone number of service agent.
  
- H. **Warranties and Bonds:** Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

## PART 3 - EXECUTION

### 3.1 MANUAL PREPARATION

- A. **Operation and Maintenance Documentation Directory:** Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

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- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
  - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
  - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
  - 1. Do not use original project record documents as part of operation and maintenance manuals.
  - 2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."
- G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

## SECTION 017839 - PROJECT RECORD DOCUMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
  - 4. Miscellaneous record submittals.
- B. Related Requirements:
  - 1. Division 01 Section "Execution" for final property survey.
  - 2. Division 01 Section "Closeout Procedures" for general closeout procedures.
  - 3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 4. Divisions 02 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set(s) of marked-up record prints.
  - 2. Number of Copies: Submit copies of record Drawings as follows:
    - a. Initial Submittal:
      - 1) Submit one paper-copy set(s) of marked-up record prints.
      - 2) Submit PDF electronic files of scanned record prints and one of file prints.
      - 3) Submit record digital data files and one set(s) of plots.
      - 4) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
    - b. Final Submittal:
      - 1) Submit three paper-copy set(s) of marked-up record prints.
      - 2) Submit PDF electronic files of scanned record prints and three set(s) of prints.

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- 3) Print each drawing, whether or not changes and additional information were recorded.
- c. Final Submittal:
- 1) Submit one paper-copy set(s) of marked-up record prints.
  - 2) Submit record digital data files and three set(s) of record digital data file plots.
  - 3) Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one paper copy of each submittal.
1. Where record Product Data are required as part of operation and maintenance manuals, additional submittal is not required.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy of each submittal.
- E. Reports: Submit written report indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

## 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. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding archive photographic documentation.
  2. Content: Types of items requiring marking include, but are not limited to, the following:

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- a. Dimensional changes to Drawings.
  - b. Revisions to details shown on Drawings.
  - c. Depths of foundations below first floor.
  - d. Locations and depths of underground utilities.
  - e. Revisions to routing of piping and conduits.
  - f. Revisions to electrical circuitry.
  - g. Actual equipment locations.
  - h. Duct size and routing.
  - i. Locations of concealed internal utilities.
  - j. Changes made by Change Order or Construction Change Directive.
  - k. Changes made following Architect's written orders.
  - l. Details not on the original Contract Drawings.
  - m. Field records for variable and concealed conditions.
  - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

## 2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
  1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
  5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as paper copy.

## 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.

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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 paper copy.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

## 2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as paper copy.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

## PART 3 - EXECUTION

### 3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's and Construction Manager's reference during normal working hours.

END OF SECTION 017839

## SECTION 024119 - SELECTIVE DEMOLITION

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

#### 1.2 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of selective demolition activities with starting and ending dates for each activity.

#### 1.4 CLOSEOUT SUBMITTALS

A. Inventory of items that have been removed and salvaged.

#### 1.5 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

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- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. 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. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.
- G. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
- C. Inventory and record the condition of items to be removed and salvaged.



### 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Arrange to shut off utilities with utility companies.
  - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

### 3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- B. Remove temporary barricades and protections where hazards no longer exist.

### 3.4 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
  - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  - 4. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
  - 5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  - 6. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:

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1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on-site designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

### 3.5 CLEANING

A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

## SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Form-facing material for cast-in-place concrete.

- B. Related Requirements:

- 1. Section 321313 "Concrete Paving" for formwork related to concrete pavement and walks.
- 2. Section 321316 "Decorative Concrete Paving" for formwork related to decorative concrete pavement and walks.

#### 1.3 DEFINITIONS

- A. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.
- B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each of the following:

- 1. Exposed surface form-facing material.
- 2. Form ties.
- 3. Form-release agent.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Form Liners: Store form liners under cover to protect from sunlight.

## PART 2 - PRODUCTS

### 2.1 FORM-FACING MATERIALS

#### A. As-Cast Surface Form-Facing Material:

1. Provide continuous, true, and smooth concrete surfaces.
2. Furnish in largest practicable sizes to minimize number of joints.
3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete, and as follows:
  - a. Plywood, metal, or other approved panel materials.
  - b. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
    - 1) APA Structural 1 Plyform, B-B or better; mill oiled and edge sealed.
    - 2) APA Plyform Class I, B-B or better; mill oiled and edge sealed.

#### B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.

1. Provide lumber dressed on at least two edges and one side for tight fit.

### 2.2 RELATED MATERIALS

#### A. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

#### B. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

#### C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

#### D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

#### E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
2. Form release agent for form liners shall be acceptable to form liner manufacturer.

#### F. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

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2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

- A. Comply with ACI 301.
- B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes .
- C. Limit concrete surface irregularities as follows:
  1. Surface Finish-2.0: ACI 117 Class B, 1/4 inch.
- D. Construct forms tight enough to prevent loss of concrete mortar.
  1. Minimize joints.
  2. Exposed Concrete: Symmetrically align joints in forms.
- E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
  1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
  2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  3. Install keyways, reglets, recesses, and other accessories, for easy removal.
- F. Do not use rust-stained, steel, form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.
  1. Provide and secure units to support screed strips
  2. Use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
  1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
  2. Locate temporary openings in forms at inconspicuous locations.
- I. Chamfer exterior corners and edges of permanently exposed concrete.

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- J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.
- K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.
  - 1. Determine sizes and locations from trades providing such items.
  - 2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.
- L. Construction and Movement Joints:
  - 1. Construct joints true to line with faces perpendicular to surface plane of concrete.
  - 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 3. Place joints perpendicular to main reinforcement.
  - 4. Space vertical joints in walls as follows .
    - a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
  - 1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
  - 2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.
- N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- P. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 INSTALLATION OF 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.
  - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
  - 3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
5. Clean embedded items immediately prior to concrete placement.

### 3.3 REMOVING AND REUSING FORMS

- A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
  1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
  2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work.
  1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
  2. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.
  1. Align and secure joints to avoid offsets.
  2. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

END OF SECTION 031000





## SECTION 032000 - CONCRETE REINFORCING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
1. Steel reinforcement bars.
  2. Welded-wire reinforcement.

#### 1.2 ACTION SUBMITTALS

- A. Shop Drawings: Comply with ACI SP-066:
1. Include placing drawings that detail fabrication, bending, and placement.
  2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
- B. Construction Joint Layout: Indicate proposed construction joints required to build the structure.
1. Location of construction joints is subject to approval of Architect.

#### 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
1. Store reinforcement to avoid contact with earth.

### PART 2 - PRODUCTS

#### 2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.
- B. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

## 2.2 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protection of In-Place Conditions:
  - 1. Do not cut or puncture vapor retarder.
  - 2. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

### 3.2 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.
  - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
  - 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318.
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
  - 1. Bars indicated to be continuous, and all vertical bars to be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
  - 2. Stagger splices in accordance with ACI 318.
  - 3. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.
- G. Install welded-wire reinforcement in longest practicable lengths.
  - 1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
    - a. For reinforcement less than W4.0 or D4.0, continuous support spacing to not exceed 12 inches.

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2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

3.3 JOINTS

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
1. Place joints perpendicular to main reinforcement.
  2. Continue reinforcement across construction joints unless otherwise indicated.
  3. Do not continue reinforcement through sides of strip placements of floors and slabs.

3.4 INSTALLATION TOLERANCES

- A. Comply with ACI 117.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner may engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
1. Steel-reinforcement placement.
  2. Steel-reinforcement welding.

END OF SECTION 032000



## SECTION 033000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 031000 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.

#### 1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

#### 1.3 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Aggregates.
5. Admixtures:
  - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
6. Vapor retarders.
7. Liquid floor treatments.
8. Curing materials.
  - a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.
9. Joint fillers.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Steel-fiber reinforcement content.
10. Synthetic micro-fiber content.
11. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
12. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
13. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
14. Intended placement method.
15. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 INFORMATIONAL SUBMITTALS

1.5 QUALITY ASSURANCE

- A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301.

1.7 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.
1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  3. Do not use frozen materials or materials containing ice or snow.

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4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.8 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I/II , gray .
2. Fly Ash: ASTM C618, Class C or F.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C33/C33M, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:
  - a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
  - b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
  - c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when

tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.

2. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C260/C260M.

D. Water and Water Used to Make Ice: ASTM C94/C94M, potable or complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4

## 2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

## 2.4 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

1. [<Click here to find, evaluate, and insert list of manufacturers and products.>](#)

## 2.5 CURING MATERIALS

A. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:
  - a. Ambient Temperature Below 50 deg F: Black.
  - b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
  - c. Ambient Temperature Above 85 deg F: White.

B. Water: Potable or complying with ASTM C1602/C1602M.

C. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

## 2.6 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber .



## 2.7 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
  - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  - 1. Fly Ash or Other Pozzolans: 25 percent by mass.
  - 2. Slag Cement: 50 percent by mass.
  - 3. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
  - 4. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
  - 1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
  - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  - 3. Use water-reducing admixture in pumped concrete,

## 2.8 CONCRETE MIXTURES

- A. Class A: Normal-weight concrete used for footings, grade beams, and tie beams.
  - 1. Exposure Class: ACI 318 F0 S0 W0 C1.
  - 2. Minimum Compressive Strength: 4000 psi at 28 days.
  - 3. Maximum w/cm: 0.50.
  - 4. Slump Limit: 4 inches, plus or minus 1 inch 8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture at Project site .
- B. Class B : Normal-weight concrete used for foundation walls.
  - 1. Exposure Class: ACI 318 F1 S0 W0 C1.
  - 2. Minimum Compressive Strength: 4000 psi at 28 days.
  - 3. Maximum w/cm: 0.50.
  - 4. Air Content:
    - a. Exposure Class F1: 5.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size.
- C. Class C: Normal-weight concrete used for interior slabs-on-ground.

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1. Exposure Class: ACI 318 F0 S0 W0 C0.
2. Minimum Compressive Strength: 4000 psi at 28 days.
3. Minimum Cementitious Materials Content: 540 lb/cu. yd.
4. Air Content:
  - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and furnish batch ticket information.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
  1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
  2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF 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.
  1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
  3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.3 INSTALLATION OF VAPOR RETARDER

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
  1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
  2. Face laps away from exposed direction of concrete pour.
  3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.

4. Lap joints 6 inches and seal with manufacturer's recommended tape.
5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.
  - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

### 3.4 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
  1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
  2. Place joints perpendicular to main reinforcement.
    - a. Continue reinforcement across construction joints unless otherwise indicated.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
  1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
  1. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
  2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

### 3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

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1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
  2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
1. If a section cannot be placed continuously, provide construction joints as indicated.
  2. Deposit concrete to avoid segregation.
  3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
    - a. Do not use vibrators to transport concrete inside forms.
    - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Do not place concrete floors and slabs in a checkerboard sequence.
  2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  3. Maintain reinforcement in position on chairs during concrete placement.
  4. Screed slab surfaces with a straightedge and strike off to correct elevations.
  5. Level concrete, cut high areas, and fill low areas.

6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

### 3.6 FINISHING FORMED SURFACES

#### A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
  - a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
  - b. Remove projections larger than 1 inch.
  - c. Tie holes do not require patching.
  - d. Surface Tolerance: ACI 117 Class D.
  - e. Apply to concrete surfaces not exposed to public view.
2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
  - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
  - b. Remove projections larger than 1/4 inch.
  - c. Patch tie holes.
  - d. Surface Tolerance: ACI 117 Class B.
  - e. Locations: Apply to concrete surfaces exposed to public view, .

#### B. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.7 FINISHING FLOORS AND SLABS

#### A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

#### B. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish.

C. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighthen until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:
  - a. Slabs on Ground:
    - 1) Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch 1/8 inch and also no more than 1/16 inch in 2 feet.
  - b. Suspended Slabs:
    - 1) Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.

3.8 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.9 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

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1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
  - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
  - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
  - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
  - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
  - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
    - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
    - 2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:
  - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
    - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
      - a) Lap edges and ends of absorptive cover not less than 12 inches.
      - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but 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.
      - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
      - b) Cure for not less than seven days.
    - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
      - a) Water.
      - b) Continuous water-fog spray.
  - b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:

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- 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
    - a) Lap edges and ends of absorptive cover not less than 12 inches.
    - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but 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.
    - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
    - b) Cure for not less than seven days.
  - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
    - a) Water.
    - b) Continuous water-fog spray.
- c. Floors to Receive Polished Finish: Contractor has option of the following:
- 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
    - a) Lap edges and ends of absorptive cover not less than 12 inches.
    - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
  - 2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
    - a) Water.
    - b) Continuous water-fog spray.
- d. Floors to Receive Chemical Stain:
- 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install curing paper over entire area of floor.
  - 2) Install curing paper square to building lines, without wrinkles, and in a single length without end joints.
  - 3) Butt sides of curing paper tight; do not overlap sides of curing paper.
  - 4) Leave curing paper in place for duration of curing period, but not less than 28 days.
- e. Floors to Receive Urethane Flooring:
- 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
  - 2) Rewet absorptive cover and cover immediately with polyethylene moisture-retaining cover with edges lapped 6 inches and sealed in place.
  - 3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.



- 4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.
- f. Floors to Receive Curing and Sealing Compound:
  - 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
  - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
  - 3) Repeat process 24 hours later and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

### 3.10 TOLERANCES

- A. Conform to ACI 117.

### 3.11 APPLICATION OF LIQUID FLOOR TREATMENTS

- A. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller in accordance with manufacturer's written instructions.

### 3.12 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
  1. Testing agency to be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
  2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
  3. Testing agency to report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
    - a. Test reports to include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
      - 1) Project name.
      - 2) Name of testing agency.
      - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
      - 4) Name of concrete manufacturer.
      - 5) Date and time of inspection, sampling, and field testing.
      - 6) Date and time of concrete placement.
      - 7) Location in Work of concrete represented by samples.
      - 8) Date and time sample was obtained.

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- 9) Truck and batch ticket numbers.
  - 10) Design compressive strength at 28 days.
  - 11) Concrete mixture designation, proportions, and materials.
  - 12) Field test results.
  - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
  - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- D. Inspections:
1. Headed bolts and studs.
  2. Verification of use of required design mixture.
  3. Concrete placement, including conveying and depositing.
  4. Curing procedures and maintenance of curing temperature.
  5. Verification of concrete strength before removal of shores and forms from beams and slabs.
  6. Batch Plant Inspections: On a random basis, as determined by Architect.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M to be performed in accordance with the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
    - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  2. Slump: ASTM C143/C143M:
    - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    - b. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete; .
    - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature: ASTM C1064/C1064M:
    - a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
  5. Compression Test Specimens: ASTM C31/C31M:
    - a. Cast and laboratory cure two sets of two 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.
  6. Compressive-Strength Tests: ASTM C39/C39M.
    - a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.

- b. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
  7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
  8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
  9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
  10. Additional Tests:
    - a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
      - 1) Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.6.6.3.
  11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
  12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 72 hours of completion of floor finishing and promptly report test results to Architect.

### 3.13 PROTECTION

- A. Protect concrete surfaces as follows:
1. Protect from petroleum stains.
  2. Diaper hydraulic equipment used over concrete surfaces.
  3. Prohibit vehicles from interior concrete slabs.
  4. Prohibit use of pipe-cutting machinery over concrete surfaces.
  5. Prohibit placement of steel items on concrete surfaces.
  6. Prohibit use of acids or acidic detergents over concrete surfaces.
  7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000



## SECTION 042200 - CONCRETE UNIT MASONRY

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Mortar and grout.
3. Steel reinforcing bars.
4. Masonry-joint reinforcement.
5. Miscellaneous masonry accessories.

B. Products Installed but not Furnished under This Section:

1. Cast-stone trim in concrete unit masonry.

C. Related Requirements:

1. Section 076200 "Sheet Metal Flashing and Trim" for sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

#### 1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

#### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

#### 1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of the following:

1. Masonry units.

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- a. Include material test reports substantiating compliance with requirements.
  - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
2. Integral water repellent used in CMUs.
  3. Cementitious materials. Include name of manufacturer, brand name, and type.
  4. Mortar admixtures.
  5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
  6. Grout mixes. Include description of type and proportions of ingredients.
  7. Reinforcing bars.
  8. Joint reinforcement.
  9. Anchors, ties, and metal accessories.
- 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 in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
  2. Include test reports, in accordance with ASTM C1019, for grout mixes required to comply with compressive strength requirement.
- C. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined in accordance with TMS 602/ACI 530.1/ASCE 6.

1.5 QUALITY ASSURANCE

1.6 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.

## 1.7 FIELD CONDITIONS

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

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

### 2.2 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
  - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) in accordance with TMS 602/ACI 530.1/ASCE 6.

## 2.3 UNIT MASONRY, GENERAL

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

## 2.4 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  - 2. Provide bullnose units for outside corners unless otherwise indicated.
- B. CMUs: ASTM C90.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi.
  - 2. Density Classification: Normal weight.
  - 3. Size (Width): Manufactured to dimensions 3/8 inch less-than-nominal dimensions.
  - 4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
  - 5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

## 2.5 MASONRY LINTELS

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



## 2.6 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
  - 1. Alkali content is not more than 0.1 percent when tested in accordance with ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Aggregate for Mortar: ASTM C144.
  - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
  - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
  - 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
  - 4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- E. Aggregate for Grout: ASTM C404.
- F. Water: Potable.

## 2.7 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, 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.
- C. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A951/A951M.
  - 1. Exterior Walls: Hot-dip galvanized carbon steel.
  - 2. Wire Size for Side Rods: 0.187-inch diameter.
  - 3. Wire Size for Cross Rods: 0.187-inch diameter.
  - 4. Spacing of Cross Rods: Not more than 16 inches o.c.
  - 5. Provide in lengths of not less than 10 feet , with prefabricated corner and tee units.

## 2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
- B. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

## 2.9 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. For exterior masonry, use portland cement-lime mortar.
  - 4. For reinforced masonry, use portland cement-lime mortar.
  - 5. 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 C270, Property 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 reinforced masonry, use Type S.
- D. Grout for Unit Masonry: Comply with ASTM C476.
  - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
  - 2. Proportion grout in accordance with ASTM C476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
  - 3. Provide grout with a slump of 8 to 11 inches as measured in accordance with ASTM C143/C143M.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
  - 2. Verify that foundations are within tolerances specified.
  - 3. Verify that reinforcing dowels are properly placed.
  - 4. Verify that substrates are free of substances that would impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

### 3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
  - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch 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 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, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch.

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 exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

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 horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

### 3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
  - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
  - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
  - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
  - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
  - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
  - 2. Wet joint surfaces thoroughly before applying mortar.
  - 3. Rake out mortar joints for pointing with sealant.
- D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.
- E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- G. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

### 3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement per table in drawings.

- B. Provide continuity at corners by using prefabricated L-shaped units.
- C. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

### 3.7 CONTROL AND EXPANSION JOINTS

- A. General: Do not install masonry control or expansion joints.
- B. Form control joints in concrete masonry **[as follows] [using one of the following methods]:**
  - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
  - 2. Install preformed control-joint gaskets designed to fit standard sash block.
  - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
  - 4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

### 3.8 LINTELS

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

### 3.9 REINFORCED UNIT MASONRY

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
  - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
  - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches.

### 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 is done at Contractor's expense.
- B. Inspections: Special inspections in accordance with Level B in TMS 402/ACI 530/ASCE 5.
  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.
- C. Testing Prior to Construction: One set of tests.
- D. Concrete Masonry Unit Test: For each type of unit provided, in accordance with ASTM C140 for compressive strength.
- E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, in accordance with ASTM C780.
- F. Mortar Test (Property Specification): For each mix provided, in accordance with ASTM C780. Test mortar for mortar air content and compressive strength.
- G. Grout Test (Compressive Strength): For each mix provided, in accordance with ASTM C1019.

### 3.11 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.

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- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.12 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200



## SECTION 053100 - STEEL DECKING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Noncomposite form deck.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.

#### 1.2 ACTION SUBMITTALS

A. Product Data:

1. Noncomposite form deck.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

#### 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

- B. Store products in accordance with SDI MOC3. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck in accordance with AISI S100.

## 2.2 NONCOMPOSITE FORM DECK

- A. Fabrication of Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite deck panels used as a form to comply with SDI NC, with the minimum section properties indicated, and with the following:
  - 1. Prime-Painted Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 33 minimum, with underside surface shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
    - a. Color: White.
  - 2. Profile Depth: 1-1/2 inches.
  - 3. Design Uncoated-Steel Thickness: 0.0358 inch.
  - 4. Span Condition: Simple span.
  - 5. Side Laps: Overlapped or interlocking seam at Contractor's option.

## 2.3 ACCESSORIES

- A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- E. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI standards for overhang and slab depth.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories in accordance with SDI C, SDI NC, and SDI RD, as applicable; manufacturer's written instructions; and requirements in this Section.

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- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
  - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install in accordance with deck manufacturer's written instructions.
- J. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.

### 3.3 INSTALLATION OF ROOF DECK

- A. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 18 inches , and as follows:
  - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
- B. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches, with end joints as follows:
  - 1. End Joints: Lapped 2 inches minimum.

### 3.4 REPAIR

- A. Repair Painting:

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1. Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation and apply repair paint.
2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
3. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
4. Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

END OF SECTION 053100

## SECTION 061000 - ROUGH CARPENTRY

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.

B. Related Requirements:

1. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.
2. Section 061753 "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.

#### 1.2 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.
- B. Exposed Framing: Framing not concealed by other construction.
- C. Lumber grading agencies, and abbreviations used to reference them, include the following:
1. NLGA: National Lumber Grades Authority.

#### 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

### PART 2 - PRODUCTS

#### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.

- B. Maximum Moisture Content of Lumber:
  - 1. Dimension Lumber: 15 percent unless otherwise indicated.

## 2.2 PRESERVATIVE TREATMENT

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
  - 2. After treatment, redry dimension lumber to 19 percent maximum moisture content.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat all rough carpentry unless otherwise indicated.
  - 1. Wood floor plates that are installed over concrete slabs.

## 2.3 DIMENSION LUMBER FRAMING

- A. Joists, Rafters, and Other Framing by Grade: No. 2 grade.
  - 1. Species:
    - a. Spruce-pine-fir; NLGA.

## 2.4 FASTENERS

- A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or ASTM F2329.
- B. Nails, Brads, and Staples: ASTM F1667.

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- C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 as appropriate for the substrate.

## 2.5 METAL FRAMING ANCHORS

- A. Allowable design loads, as published by manufacturer, are to meet or exceed those of basis-of-design products. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors are to be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.
  - 1. Use for interior locations unless otherwise indicated.
- C. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick. Tie fastens to side of rafter or truss, face of top plates, and side of stud below.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- D. Do not splice structural members between supports unless otherwise indicated.
- E. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- F. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

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- G. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

END OF SECTION 061000



## SECTION 061600 - SHEATHING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for plywood backing panels.

#### 1.2 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 WOOD PANEL PRODUCTS

- A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- B. Factory mark panels to indicate compliance with applicable standard.

#### 2.2 WALL SHEATHING

- A. Plywood Sheathing, Walls: Either DOC PS 1 or DOC PS 2 , Exposure 1 sheathing.
1. Span Rating: Not less than 32/16.
  2. Nominal Thickness: Not less than 1/2 inch.

#### 2.3 ROOF SHEATHING

- A. Plywood Sheathing, Roofs: Either DOC PS 1 or DOC PS 2 , Exposure 1 sheathing.
1. Span Rating: Not less than 40/20 .
  2. Nominal Thickness: Not less than 5/8 inch

## 2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. For roof sheathing, provide fasteners .
- B. Nails, Brads, and Staples: ASTM F1667.

## 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 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate 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.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

### 3.2 INSTALLATION OF WOOD STRUCTURAL PANEL

- 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.

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- b. Screw to cold-formed metal framing.
- c. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 061600



## SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Wood products.

#### 1.2 DEFINITIONS

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

#### 1.3 ACTION SUBMITTALS

A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification from treating plant that treated materials comply 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 from treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to truss fabricator.

B. Shop Drawings: Show fabrication and installation details for trusses.

1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
2. Indicate sizes, stress grades, and species of lumber.
3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.

6. Show splice details and bearing details.

- C. Delegated Design Submittals: For metal-plate-connected wood trusses 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 DELIVERY, STORAGE, AND HANDLING

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

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Metal-plate-connected wood trusses are to be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
1. Design Loads: As indicated.
  2. Maximum Deflection under Design Loads:
    - a. Roof Trusses: Vertical deflection of 1/240 of span.
- C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

## 2.2 WOOD PRODUCTS

- A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (ALSC) Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
  - 3. Provide dressed lumber, S4S.
  - 4. Provide dry lumber with 15 percent maximum moisture content at time of dressing.
- B. Minimum Chord Size for Roof Trusses: 2 by 6 inches nominal for both top and bottom chords.
- C. Minimum Specific Gravity for Top Chords: 0.50.
- D. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry."

## 2.3 METAL CONNECTOR PLATES

- A. Fabricate connector plates to comply with TPI 1.
- B. Hot-Dip Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.
  - 1. Use for interior locations unless otherwise indicated.

## 2.4 FASTENERS

- A. Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
  - 2. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.

## 2.5 FABRICATION

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

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses 24 inches o.c.; adjust and align trusses in location before permanently fastening.
- G. Securely connect each truss ply required for forming built-up girder trusses.
  - 1. Anchor trusses to girder trusses as indicated.
- H. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
  - 1. Install bracing to comply with Section 061000 "Rough Carpentry."
- I. Install wood trusses within installation tolerances in TPI 1.



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- J. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- K. Replace wood trusses that are damaged or do not comply with requirements.
  - 1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- C. Repair damaged galvanized coatings on exposed surfaces in accordance with ASTM A780/A780M and manufacturer's written instructions.

END OF SECTION 061753



## SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

B. Related Requirements:

1. Section 123661.16 "Solid Surfacing Countertops."

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate and cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:

1. Plastic laminates, for each color, pattern, and surface finish.
2. Thermoset decorative panels, for each color, pattern, and surface finish.

#### 1.3 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

#### 1.4 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 occupancy levels during the remainder of the construction period.

## PART 2 - PRODUCTS

### 2.1 ARCHITECTURAL CABINET FABRICATORS

- A. Fabricators: Subject to compliance with requirements, provide products by one of the following. (Same Fabricator as Simulated Stone Countertops, Wood Frames and Wood Trim):
1. Horizon Group, Inc.
  2. Marcon Industries, Inc.
  3. Robertson Manufacturing, Inc.
  4. Red Bud Ridge Manufacturing, Inc.

### 2.2 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
- B. Grade: Custom.
- C. Type of Construction: Face frame.
- D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
- F. Laminate Cladding for Exposed Surfaces:
1. Horizontal Surfaces: Grade HGS.
  2. Vertical Surfaces: Grade HGS.
  3. Pattern Direction: Horizontally for drawer fronts, doors, and fixed panels.
- G. Materials for Semi-exposed Surfaces:
1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
- H. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. As selected by the Architect from the manufacturer's full line.

### 2.3 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

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1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
  1. Particleboard: ANSI A208.1, Grade M-2.
  2. Softwood Plywood: DOC PS 1.
  3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
  4. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
    - a. Color: White.

#### 2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening, self-closing.
- C. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
- D. Catches: Ball friction catches, BHMA A156.9, B03013.
- E. Door Silencers: BHMA A156.16, L03011.
- F. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
  1. To be selected by the architect.

#### 2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood 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.
- C. Adhesives: Do not use adhesives that contain urea formaldehyde.
- D. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.

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1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

## 2.6 FABRICATION

- A. 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.
- B. 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.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

### 3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. 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 woodwork.
- E. Cabinets: Install without distortion so doors and drawers fit openings properly 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.
  1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

END OF SECTION 064116

## SECTION 072100 - THERMAL INSULATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board insulation.
2. Glass-fiber blanket insulation.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Extruded polystyrene foam-plastic board insulation.
2. Glass-fiber blanket insulation.

### PART 2 - PRODUCTS

#### 2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

A. Extruded Polystyrene Board Insulation, Type IV: ASTM C578, Type IV, 25-psi minimum compressive strength; unfaced.

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. Diversi Foam Products.
  - b. DuPont de Nemours, Inc.
  - c. Owens Corning.
  - d. The Dow Chemical Company.
2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
3. Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.
4. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
5. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

## 2.2 GLASS-FIBER BLANKET INSULATION

- A. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I; passing ASTM E136 for combustion characteristics.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. CertainTeed; SAINT-GOBAIN.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Owens Corning.
  2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
  3. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.
  4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

## 2.3 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
  2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
  3. Polyurethane Pour-In-Place Insulation: Closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84, specifically formulated for pour-in-place applications.
    - 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) Huntsman Building Solutions.
- 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.



### PART 3 - EXECUTION

#### 3.1 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. Install insulation with manufacturer's R-value label exposed after insulation is installed.
- D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

#### 3.2 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
  - 1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
  - 1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

#### 3.3 INSTALLATION OF FOUNDATION WALL INSULATION

- A. Butt panels together for tight fit.
- B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors.
- C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

### 3.4 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer.
1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
  2. Press units firmly against inside substrates.
  3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

### 3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  3. Maintain 3-inch 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, 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 C1320 and as follows:
    - a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

END OF SECTION 072100

## SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Vapor-retarding, fluid-applied air barriers.
  - 2. Vapor-permeable, fluid-applied air barriers.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For air-barrier assemblies.
  - 1. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Product test reports.
- C. Field quality-control reports.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

- 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 E2357.

## 2.2 HIGH-BUILD AIR BARRIERS, VAPOR PERMEABLE

- A. High-Build, Vapor-Permeable Air Barrier: Modified bituminous or synthetic polymer membrane with an installed dry film thickness, according to manufacturer's written instructions, of 35 mils or thicker over smooth, void-free substrates.

- 1. Modified Bituminous Type:

- 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) Mar-flex Waterproofing & Building Products.
- 2) Tremco Incorporated.

- 2. Synthetic Polymer Type:

- 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) DuPont de Nemours, Inc.
- 2) GCP Applied Technologies Inc.
- 3) Henry Company.
- 4) Tremco Incorporated.

- 3. Physical and Performance Properties:

- a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E2178.
- b. Vapor Permeance: Minimum 10 perms; ASTM E96/E96M, Desiccant Method, Procedure A.
- c. Ultimate Elongation: Minimum 200 percent; ASTM D412, Die C.
- d. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D4541.
- e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- f. UV Resistance: Can be exposed to sunlight for 30 days according to manufacturer's written instructions.

## 2.3 ACCESSORY MATERIALS

- A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-

barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

## PART 3 - EXECUTION

### 3.1 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
- D. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- E. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- F. Bridge expansion joints discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

### 3.2 INSTALLATION

- A. Install materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
  - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
  - 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
  - 3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
  - 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- B. 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.

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- C. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
- D. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.
- E. High-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply air-barrier material in full contact around protrusions such as masonry ties.
  - 1. Vapor-Permeable, High-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, but not less than 35 mils, applied in one or more equal coats.
- F. Do not cover air barrier until it has been tested and inspected by testing agency.
- G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.3 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
- B. Remove masking materials after installation.

END OF SECTION 072726

## SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Standing-seam metal roof panels.

#### 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 fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- C. Samples: For each type of metal panel indicated.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warranties: Sample of special 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. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

## 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Finish Warranty Period: 20 years from date of Substantial Completion.
  - 2. Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Other Design Loads: As indicated on Drawings.
  - 3. Deflection Limits: For wind loads, no greater than 1/180 1/240 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E1680 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 1.57 lbf/sq. ft..
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 2.86 lbf/sq. ft..
- D. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E2140.
- E. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
  - 1. Uplift Rating: UL 90.
- F. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.



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1. Fire/Windstorm Classification: Class 1A- 105.
  2. Hail Resistance: SH.
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

## 2.2 STANDING-SEAM METAL ROOF PANELS

- A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1514.
  2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1637.
- B. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and snapping panels together.
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. Berridge Manufacturing Company.
    - b. Fabral; a brand of OmniMax International.
    - c. Firestone Building Products.
    - d. Firestone Metal Products.
    - e. MBCI; Cornerstone Building Brands.
    - f. McElroy Metal, Inc.
    - g. Metal Sales Manufacturing Corporation.
    - h. Morin - A Kingspan Group Company.
    - i. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.
  2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
    - a. Nominal Thickness: 0.022 inch.
    - b. Exterior Finish: Three-coat fluoropolymer.

- c. Color: As selected by Architect from manufacturer's full range.
3. Clips: One-piece fixed to accommodate thermal movement.
  - a. Material: 0.028-inch- nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
4. Joint Type: Double folded.
5. Panel Coverage: 16 inches.
6. Panel Height: 2.0 inches.

## 2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
  1. Thermal Stability: Stable after testing at 240 deg F; ASTM D1970.
  2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970.
- B. Felt Underlayment: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felts.
- C. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

## 2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
  1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
  2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

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- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Gutters and Downspouts: Formed from same material as roof panels according to SMACNA's "Architectural Sheet Metal Manual." Finish to match metal roof panels.
- E. Roof Curbs: Fabricated from same material as roof panels, 0.048-inch nominal thickness; with bottom of skirt profiled to match roof panel profiles and with welded top box and integral full-length cricket. Fabricate curb subframing of 0.060-inch-nominal thickness, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Finish roof curbs to match metal roof panels.
- F. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- G. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch wide and 1/8 inch thick.
  - 2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.
  - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

## 2.5 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal

Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

## 2.6 FINISHES

### A. Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat.
2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- #### A. Miscellaneous Supports:
- Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

### 3.2 INSTALLATION OF UNDERLAYMENT

- #### A. Self-Adhering Sheet Underlayment:
- Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
1. Apply over the entire roof surface.
- #### B. Felt Underlayment:
- Apply at locations indicated below, in shingle fashion to shed water, and with lapped joints of not less than 2 inches.
1. Apply over the entire roof surface.
- #### C. Slip Sheet:
- Apply slip sheet over underlayment before installing metal roof panels.
- #### D. Flashings:
- Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

### 3.3 INSTALLATION OF STANDING SEAM METAL ROOF PANELS

- #### A. Standing-Seam Metal Roof Panel Installation:
- Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
1. Install clips to supports with self-tapping fasteners.

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2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
  3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
  4. Watertight Installation:
    - a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
    - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
    - c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- C. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

### 3.4 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074113.16



## SECTION 074213.13 - FORMED METAL WALL PANELS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Exposed-fastener, lap-seam metal wall panels.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

C. Samples: For each type of metal panel indicated.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Warranties: Samples of special warranties.

#### 1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

#### 1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

#### 1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Finish Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
  - 1. Wind Loads: 90 MPH.
  - 2. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 1.57 lbf/sq. ft.
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 2.86 lbf/sq. ft.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

### 2.2 EXPOSED-FASTENER, LAP-SEAM METAL WALL PANELS

- A. Provide factory-formed metal panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.
- B. Corrugated-Profile, Exposed-Fastener Metal Wall Panels Match existing siding on the building:
  - 1. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation;



structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

- a. Nominal Thickness: 0.022 inch.
- b. Exterior Finish: Two-coat fluoropolymer.
- c. Color: As selected by Architect from manufacturer's full range.

## 2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
  1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
  2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch wide and 1/8 inch thick.
  2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.
  3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

## 2.4 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

## 2.5 FINISHES

- A. Panels and Accessories:
  - 1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.
  - 2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

### 3.2 INSTALLATION

- A. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
  - 1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
  - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.

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3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
5. Flash and seal panels with weather closures at perimeter of all openings.

B. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

### 3.3 CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074213.13



## SECTION 076200 - SHEET METAL FLASHING AND TRIM

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Formed roof-drainage sheet metal fabrications.
2. Formed low-slope roof sheet metal fabrications.
3. Formed steep-slope roof sheet metal fabrications.
4. Formed wall sheet metal fabrications.

#### 1.2 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.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

C. Sample warranty.

#### 1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

#### 1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

## 1.6 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 SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. SPRI Wind Design Standard: Manufacture and install copings 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. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
  1. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
    - a. Color: As selected by Architect from full range of industry colors and color densities.

- b. Color Range: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; 2D (dull, cold rolled) finish.
- D. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A where unfinished and aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
  - 1. Surface: Manufacturer's standard clear acrylic coating on both sides.
  - 2. Exposed Coil-Coated Finish:
    - a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 3. Color: As selected by Architect from manufacturer's full range.

### 2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
- B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F; and complying with physical requirements of ASTM D226/D226M for Type I and Type II felts.
  - 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. Atlas Molded Products, a division of Atlas Roofing Corporation.
    - b. Intertape Polymer Group.
    - c. Kirsch Building Products.
    - d. SDP Advanced Polymer Products Inc.
- C. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
  - 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:

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- a. ATAS International, Inc.
  - b. Carlisle WIP Products; a brand of Carlisle Construction Materials.
  - c. Henry Company.
  - d. Owens Corning.
  - e. Polyglass U.S.A., Inc.
2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.
- D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

## 2.4 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-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Solder:
1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, with maximum lead content of 0.2 percent.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. 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.



- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

## 2.5 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 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 from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. 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.
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

## 2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch-long sections. Furnish flat-stock gutter brackets and gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint

covers, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.

1. Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen.
- B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors.
1. Hanger Style: Custom – see drawings and details.
  2. Fabricate from the following materials:
    - a. Aluminum: 0.024 inch thick.
- C. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch-wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fabricate from the following materials:
1. Aluminum: 0.032 inch thick.

## 2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Copings: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.
1. Fabricate from the Following Materials:
    - a. Aluminum: 0.050 inch thick.
- B. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Aluminum: 0.040 inch thick.
  2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
- C. Counterflashing and Flashing Receivers: Fabricate from the following materials:
1. Aluminum: 0.032 inch thick.
  2. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.
- D. Roof-Penetration Flashing: Fabricate from the following materials:
1. Galvanized Steel: 0.028 inch thick.
  2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
- E. Roof-Drain Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.016 inch thick.

## 2.8 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
  - 1. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.
- B. Valley Flashing: Fabricate from the following materials:
  - 1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
- C. Drip Edges: Fabricate from the following materials:
  - 1. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.
- D. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:
  - 1. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

## 2.9 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot-long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch-high, end dams. Fabricate from the following materials:
  - 1. Stainless Steel: 0.016 inch thick.
- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:
  - 1. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

## PART 3 - EXECUTION

### 3.1 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
- B. 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.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side

edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.

### 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 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 and stainless-steel 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 substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- 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 079200 "Joint Sealants."

- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
  - 1. Do not solder metallic-coated steel and aluminum sheet.
  - 2. Do not use torches for soldering.
  - 3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
  - 4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
  - 5. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.
- H. 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 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, 50 feet apart. Install expansion-joint caps.
  - 2. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.
- C. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c.

### 3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements 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. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.

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- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- E. 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.
- F. 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. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042000 "Unit Masonry." Section 044200 "Exterior Stone Cladding."
- C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, 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 manufacturer's written installation instructions.

END OF SECTION 076200

## SECTION 078413 - PENETRATION FIRESTOPPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
1. Penetrations in fire-resistance-rated walls.
  2. Penetrations in horizontal assemblies.
  3. Penetrations in smoke barriers.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- B. Product test reports.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
- B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
1. Penetration firestopping tests are performed by UL
  2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems bearing marking of qualified testing and inspection agency.
- C. Preinstallation Conference: Conduct conference at Project site.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. A/D Fire Protection Systems Inc.
  2. Grace Construction Products.
  3. Hilti, Inc. Johns Manville.
  4. Nelson Firestop Products.
  5. NUCO Inc.
  6. Passive Fire Protection Partners.
  7. RectorSeal Corporation.
  8. Specified Technologies Inc.
  9. 3M Fire Protection Products.
  10. Tremco, Inc.; Tremco Fire Protection Systems Group.
  11. USG Corporation.
  12. or approved manufacturer.

### 2.2 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
  2. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- F. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D



(EPA Method 24):

1. Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

- G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- D. Install fill materials for firestopping by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

#### 3.2 IDENTIFICATION

- A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."

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2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.3 FIELD QUALITY CONTROL

- A. Engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
- C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.4 PENETRATION FIRESTOPPING SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ. Where Intertek ETL SEMKO-listed systems are indicated, they refer to design numbers in Intertek ETL SEMKO's "Directory of Listed Building Products" under "Firestop Systems."
- B. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."

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Type of Penetrant	Wood Studs & Gypsum Wallboard UL Design No. U300 Series	Metal Studs & Gypsum Wallboard UL Design No. U400 Series	Concrete, CMU or Masonry UL Design No. U900 Series Any Thickness	Concrete CMU or Masonry UL Design No. U900 Series Greater Than 8-in.
<b>NO PENETRANTS</b>				
UL System Single penetrant	W-L-0000 SERIES OR NOTE 4	W-L-0000 SERIES OR NOTE 4	W-J-0000 SERIES OR NOTE 4	NOTE 4
UL System Multiple penetrants	W-L-0000 SERIES OR NOTE 4	W-L-0000 SERIES OR NOTE 4	W-J-0000 SERIES OR NOTE 4	NOTE 4
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE	NONE
<b>METALLIC, UNINSULATED PIPE, CONDUIT, OR TUBING (EXAMPLES: COPPER, IRON, STEEL)</b>				
UL System Single penetrant	W-L-1000 SERIES	W-L-1000 SERIES	C-AJ-1000 OR W-J-1000 SERIES	C-BK-1000 OR W-K-1000 SERIES
UL System Multiple penetrants	W-L-8000 SERIES NOTE 5	W-L-8000 SERIES NOTE 5	C-AJ-8000 OR W-J-8000 SERIES -- NOTE 5	N/A
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE	NONE
<b>NONMETALLIC, UNINSULATED PIPE, CONDUIT, OR TUBING (EXAMPLES: PVC, CPVC, GLASS)</b>				
UL System Single penetrant	W-L-2000 SERIES	W-L-2000 SERIES	C-AJ-2000 OR W-J-2000 SERIES	C-BK-1000 OR W-K-1000 SERIES
UL System Multiple penetrants	W-L-8000 SERIES NOTE 5	W-L-8000 SERIES NOTE 5	C-AJ-8000 OR W-J-8000 SERIES -- NOTE 5	N/A
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE	NONE
<b>ELECTRICAL CABLES</b>				
UL System Single penetrant	W-L-3000 SERIES	W-L-3000 SERIES	C-AJ-3000 OR W-J-3000 SERIES	N/A
UL System Multiple penetrants	NONE	NONE	C-AJ-3000 OR W-J-3000 SERIES	NONE

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F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)

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Type of Penetrant	Wood Studs & Gypsum Wallboard UL Design No. U300 Series	Metal Studs & Gypsum Wallboard UL Design No. U400 Series	Concrete, CMU or Masonry UL Design No. U900 Series Any Thickness	Concrete CMU or Masonry UL Design No. U900 Series Greater Than 8-in.
Additional Requirements	NONE	NONE	NONE	NONE
<b>CABLE TRAYS W/ELECTRICAL CABLES</b>				
UL System Single penetrant	N/A	C-AJ-4000 OR F-A-4000 SERIES	C-B J-3000 OR F-B-3000 SERIES	
UL System Multiple penetrants	NONE	NONE	NONE	
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	
Additional Requirements	NONE	NONE	NONE	
<b>INSULATED PIPES (EXAMPLES: COPPER, GLASS, IRON, PLASTIC, STEEL) IN SYSTEMS OPERATING BETWEEN 32 DEG F (0 DEG C) AND 122 DEG F (50 DEG C) (NOTE 1)</b>				
UL System Single penetrant	W-L-5000 SERIES	W-L-5000 SERIES	C-AJ-5000 OR W-J-5000 SERIES	N/A
UL System Multiple penetrants	W-L-8000 SERIES NOTE 5	W-L-8000 SERIES NOTE 5	C-AJ-5000 OR W-J-5000 SERIES	NONE
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NOTE 6	NOTE 6	NOTE 6	NONE
<b>MISC. ELECTRICAL PENETRATIONS (EXAMPLES: BUS DUCTS)</b>				
UL System Single penetrant	W-L-6000 SERIES	W-L-6000 SERIES	C-AJ-6000 SERIES	N/A
UL System Multiple penetrants	N/A	N/A	C-AJ-6000 SERIES	NONE
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE	NONE
<b>METAL DUCT</b>				
UL System Single penetrant	W-L-7000 SERIES	W-L-7000 SERIES	C-AJ-7000 OR W-J-7000 SERIES	N/A

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UL System Multiple penetrants	N/A	N/A	N/A	NONE
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NOTE 7	NOTE 7	NOTE 7	NONE
<b>UL LISTED ELECTRICAL BOXES</b>				
UL System Single penetrant	CLIV OR NOTE 8	CLIV OR NOTE 8	N/A	N/A
UL System Multiple penetrants	N/A	N/A	N/A	NONE

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Type of Penetrant	Wood Studs & Gypsum Wallboard UL Design No. U300 Series	Metal Studs & Gypsum Wallboard UL Design No. U400 Series	Concrete, CMU or Masonry UL Design No. U900 Series Any Thickness	Concrete CMU or Masonry UL Design No. U900 Series Greater Than 8-in.
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE	NONE
<b>OTHER RECESSED DEVICES (NOTE3)</b>				
UL System Single penetrant	NOTE 8	NOTE 8	NOTE 8	NOTE 8
UL System Multiple penetrants	NONE	NONE	NOTE 8	NONE
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE	NONE

**FLOOR SYSTEM**

Type of Penetrant	Wood Framed Floor	Poured Concrete Floor Any Thickness	Poured Concrete Floor Greater Than 5 Inches
<b>NO PENETRANTS</b>			
UL System Single penetrant	F-C-5000 SERIES	C-AJ-5000 OR F-A-5000 SERIES	C-BJ-5000 OR F-B-5000 SERIES
UL System Multiple penetrants	F-C-8000 SERIES NOTE 5	C-AJ-8000 OR F-A-8000 SERIES - NOTE 5	C-A J-8000 OR F-A-8000 SERIES - NOTE 5
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE
<b>METALLIC, UNINSULATED PIPE, CONDUIT, OR TUBING (EXAMPLES: COPPER, IRON, STEEL)</b>			
UL System Single penetrant	F-C-1000 SERIES	C-AJ-1000 OR F-A-1000 SERIES	C-BJ-1000 OR F-B-1000 SERIES
UL System Multiple penetrants	F-C-8000 SERIES NOTE 5	C-AJ-8000 OR F-A-8000 SERIES -- NOTE 5	C-BJ-8000 OR F-B-8000 SERIES -- NOTE 5
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE

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**NONMETALLIC, UNINSULATED PIPE, CONDUIT, OR TUBING (EXAMPLES: PVC, CPVC, GLASS)**

UL System Single penetrant	F-C-2000 SERIES	C-AJ-2000 OR F-A-2000 SERIES	C-BJ-2000 OR F-B-2000 SERIES
UL System Multiple penetrants	NONE	C-AJ-8000 OR F-A-8000 SERIES -- NOTE 5	C-BJ-8000 OR F-B-8000 SERIES -- NOTE 5
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING



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Type of Penetrant	Wood Framed Floor	Poured Concrete Floor Any Thickness	Poured Concrete Floor Greater Than 5 Inches
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE
<b>ELECTRICAL CABLES</b>			
UL System Single penetrant	F-C-3000 SERIES	C-AJ-3000 OR F-A-3000 SERIES	N/A
UL System Multiple penetrants	NONE	NONE	NONE
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE
<b>CABLE TRAYS W/ELECTRICAL CABLES</b>			
UL System Single penetrant	N/A	C-AJ-4000 OR F-A-4000 SERIES	C-BJ-3000 OR F-B-3000 SERIES
UL System Multiple penetrants	NONE	NONE	NONE
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE
<b>INSULATED PIPES (EXAMPLES: COPPER, GLASS, IRON, PLASTIC, STEEL) IN SYSTEMS OPERATING BETWEEN 32 DEG F (0 DEG C) AND 122 DEG F (50 DEG C) (NOTE 1)</b>			
UL System Single penetrant	F-C-5000 SERIES	C-AJ-5000 OR F-A-5000 SERIES	C-BJ-5000 OR F-B-5000 SERIES
UL System Multiple penetrants	F-C-8000 SERIES NOTE 5	C-AJ-8000 OR F-A-8000 SERIES - NOTE 5	C-AJ-8000 OR F-A-8000 SERIES - NOTE 5
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE
<b>INSULATED PIPES (EXAMPLES: COPPER, GLASS, IRON, PLASTIC, STEEL) IN SYSTEMS OPERATING BETWEEN 32 DEG F (0 DEG C) OR ABOVE 122 DEG F (50 DEG C) (NOTE 2)</b>			
UL System Single penetrant	F-C-5000 SERIES	C-AJ-5000 OR F-A-5000 SERIES	C-A J-5000 OR F-A-5000 SERIES
UL System Multiple penetrants	F-C-8000 SERIES NOTE 5	C-AJ-8000 OR F-A-8000 SERIES - NOTE 5	C-B J-8000 OR F-B-8000 SERIES - NOTE 5
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
		T Rating	

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	L TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NOTE 6	NOTE 6	NOTE 6
<b>MISC. ELECTRICAL PENETRATIONS (EXAMPLES: BUS DUCTS)</b>			
UL System Single penetrant	N/A	C-AJ-6000 SERIES	C-AJ-6000 SERIES
UL System Multiple penetrants	NONE	C-AJ-8000 OR F-A-8000 SERIES - NOTE 5	C-AJ-6000 SERIES

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Type of Penetrant	Wood Framed Floor	Poured Concrete Floor Any Thickness	Poured Concrete Floor Greater Than 5 Inches
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE
<b>METAL DUCT</b>			
UL System Single penetrant	F-C-7000 SERIES	C-AJ-7000 OR F-A-7000 SERIES	C-B J-7000 OR F-B-7000 SERIES
UL System Multiple penetrants	N/A	N/A	N/A
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NOTE 7	NOTE 7	NOTE 7
<b>UL LISTED ELECTRICAL BOXES</b>			
UL System Single penetrant	N/A	N/A	N/A
UL System Multiple penetrants	N/A	N/A	N/A
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE
<b>OTHER RECESSED DEVICES (NOTE 3)</b>			
UL System Single penetrant	NOTE 8	NOTE 8	NOTE 8
UL System Multiple penetrants	NONE	NONE	NONE
F Rating	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING	EQUAL TO BARRIER RATING
T Rating	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)	EQUAL TO F RATING (NOTE 9)
Additional Requirements	NONE	NONE	NONE

## NOTES

1. Examples of systems that operate between 32 deg f (0 deg c) and 122 deg f (50 deg c):
  - a. chilled water supply & return
  - b. domestic hot water less than 122 deg F
  - c. heat pump water supply and return
  - d. domestic hot water recirculation less than 122 deg F
  - e. domestic cold water
2. Examples of systems operating below 32 deg f (0 deg c) or above 122 deg f (50 deg c):
  - a. steam supply & return
  - b. heating hot water supply & return steam vent
  - c. hot or chilled water supply & return condensate pump discharge
  - d. glycol heating hot water supply & return boiler blow down
  - e. domestic hot water supply 140 deg f (60 deg c) cryogenic vent
  - f. domestic hot water recirculation 140 deg f (60 deg c)
3. Examples of other recessed devices:
  - a. medical gas zone valves
  - b. unit heaters medical gas outlets fire fighters' phone fire valve cabinets
  - c. fire extinguisher cabinet fire hose cabinets
4. Seal opening using barrier's original construction.
5. Where a series 8000 classified system is not available, install penetrants singly, and provide single- penetrant systems .
6. For systems that operate below 32 deg f (0 deg c) or above 122 deg f (50 deg c), comply with the following additional requirements:
  - a. Provide TPFS system using intumescent elastomeric wrap strip as its fill, void, or cavity material.
  - b. Do not use series 8000 penetrations. Provide only single penetrations.
7. For penetrations protected with dampers, provide TPFS system approved by damper manufacturer.
8. Where UL classified systems are not available for other recessed devices, maintain continuity of Rated barrier construction around recess.
9. Where penetrant exits penetration entirely within a floor, provide firestop system with the same level of fire resistance as the floor system. One-sided composite panel systems are not allowed.

**END OF SECTION 078413**

## SECTION 078443 - JOINT FIRESTOPPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints in smoke barriers.

#### 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. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

#### A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
  - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
    - 1) UL in its "Fire Resistance Directory."

### 2.2 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
  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. 3M Fire Protection Products.
    - b. A/D Fire Protection Systems Inc.
    - c. Hilti, Inc.
    - d. Nelson Firestop; a brand of Emerson Industrial Automation.
    - e. NUCO Inc.
    - f. Passive Fire Protection Partners.
    - g. RectorSeal.
    - h. Thermafiber, Inc.; an Owens Corning company.
    - i. Tremco, Inc.
  2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.

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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. 3M Fire Protection Products.
    - b. A/D Fire Protection Systems Inc.
    - c. Hilti, Inc.
    - d. NUCO Inc.
    - e. RectorSeal.
    - f. Tremco, Inc.
  2. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.
- D. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- C. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- D. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:
  1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
  2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.

3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.2 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  2. Contractor's name, address, and phone number.
  3. Designation of applicable testing agency.
  4. Date of installation.
  5. Manufacturer's name.
  6. Installer's name.

### 3.3 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 078443



## SECTION 079200 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.

- B. Related Sections:

1. Division 09 Section "Tiling" for sealing tile joints.

#### 1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than eight pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

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1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
2. Conduct field tests for each application indicated below:
  - a. Each kind of sealant and joint substrate indicated.
3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
  - a. 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.
    - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch wide joints formed between two 6-inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. 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.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer and testing agency.

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- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- G. Field-Adhesion Test Reports: For each sealant application tested.
- H. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
  - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
  - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.7 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:

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1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 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.
  1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  1. Architectural Sealants: 250 g/L.
  2. Sealant Primers for Nonporous Substrates: 250 g/L.
  3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system 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. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
  1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

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- E. Stain-Test-Response Characteristics: Where sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

## 2.2 SILICONE JOINT SEALANTS

- A. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. BASF Building Systems; Omniplus.
    - b. Dow Corning Corporation; 786 Mildew Resistant.
    - c. GE Advanced Materials - Silicones; Sanitary SCS1700.
    - d. May National Associates, Inc.; Bondaflex Sil 100 WF.
    - e. Tremco Incorporated; Tremsil 200 Sanitary.

## 2.3 URETHANE JOINT SEALANTS

- A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Sika Corporation, Construction Products Division; Sikaflex - 15LM.
    - b. Tremco Incorporated; Vulkem 921.
- B. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Pecora Corporation; Dynatrol II.
    - b. Polymeric Systems, Inc.; PSI-270.
    - c. Tremco Incorporated; Dymeric 240.
- C. Immersible Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920. Type M, Grade P, Class 25, for Use T and I.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. LymTal International, Inc.; Iso-Flex 880 GB.
    - b. May National Associates, Inc.; Bondaflex PUR 2 SL.
    - c. Tremco Incorporated; Vulkem 245.

## 2.4 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, type approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

## 2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings)

tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
  - a. Concrete.
  - b. Masonry.
  - c. Unglazed surfaces of porcelain tile.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
  - a. Metal.
  - b. Glass.
  - c. Porcelain enamel.
  - d. Glazed surfaces of porcelain tile.

- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  1. Do not leave gaps between ends of sealant backings.
  2. Do not stretch, twist, puncture, or tear sealant backings.
  3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

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- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
  - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
  - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
    - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

### 3.4 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 3 tests for the first 5 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.
    - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
  - 3. Inspect tested joints and report on the following:
    - a. Whether sealants filled joint cavities and are free of voids.
    - b. Whether sealant dimensions and configurations comply with specified requirements.



- c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
  4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
  5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- 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.

### 3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200



## SECTION 079513.16 - EXTERIOR EXPANSION JOINT COVER ASSEMBLIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Exterior expansion joint covers.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each expansion joint cover assembly.
  - 1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams.
- C. Samples: For each exposed expansion joint cover assembly and for each color and texture specified.

### PART 2 - PRODUCTS

#### 2.1 ASSEMBLY DESCRIPTION

- A. Furnish units in longest practicable lengths to minimize field splicing.
- B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E1966 by a qualified testing agency.
  - 1. Hose Stream Test: Wall-to-wall and wall-to-soffit assemblies shall be subjected to hose stream testing.

- C. Expansion Joint Design Criteria:

1. Type of Movement: Wind sway.
  - a. Nominal Joint Width: As indicated on Drawings.
  - b. Minimum Joint Width: As indicated on Drawings.
  - c. Maximum Joint Width: As indicated on Drawings.
2. Seismic Movement:
  - a. Joint Movement: As indicated on Drawings.

### 2.3 EXTERIOR EXPANSION JOINT COVERS

- A. Exterior Metal-Plate Joint Cover: Assembly consisting of sliding metal cover plate in continuous contact with gaskets mounted on metal frames fixed to sides of joint gap.
  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. Balco; a CSW Industrials Company.
    - b. Construction Specialties, Inc.
    - c. inpro Corporation.
  2. Application: Wall to wall.
  3. Installation: Surface mounted.
  4. Fire-Resistance Rating: Not less than that of adjacent construction.
  5. Exposed Metal:
    - a. Aluminum: Clear anodic, Class I.
      - 1) Color: Clear.
- B. Exterior Elastomeric-Seal Joint Cover: Assembly consisting of elastomeric seal anchored to surface-mounted frames fixed to sides of joint gap.
  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. Balco; a CSW Industrials Company.
    - b. Construction Specialties, Inc.
    - c. inpro Corporation.
  2. Application: Wall to wall.
  3. Installation: Recessed.
  4. Fire-Resistance Rating: Not less than that of adjacent construction one hour two hours Insert rating.
  5. Exposed Metal:
    - a. Aluminum: Clear anodic, Class I Clear anodic, Class II.

- 1) Color: Clear.
6. Seal: Preformed elastomeric membrane or extrusion.
    - a. Color: Black.

## 2.4 MATERIALS

- A. Aluminum: ASTM B221, Alloy 6063-T5 for extrusions; ASTM B209, Alloy 6061-T6 for sheet and plate.
- B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.
- C. Fire Barriers: Any material or material combination, to comply with performance criteria for required fire-resistance rating.
- D. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.

## 2.5 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

## 2.6 ACCESSORIES

- A. Moisture Barriers: Manufacturer's standard moisture barrier consisting of a continuous, waterproof membrane within joint and attached to substrate on sides of joint.
  1. Provide where indicated on Drawings.
- B. Manufacturer's standard attachment devices, as indicated or required for complete installations.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

- C. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- D. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
  - 1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
  - 2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
  - 3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
  - 4. Install frames in continuous contact with adjacent surfaces.
    - a. Shimming is not permitted.
  - 5. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- E. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
  - 1. Provide in continuous lengths for straight sections.
  - 2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
  - 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- F. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
- G. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.
- H. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.
  - 1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.
- I. Moisture Barrier Drainage: If indicated, provide drainage fitting and connect to drains.
- J. Transition to Roof Expansion Joint Covers: Coordinate installation of exterior wall and soffit expansion joint covers with roof expansion joint covers specified in Section 077129 "Manufactured Roof Expansion Joints." Install factory-fabricated units at transition between exterior walls and soffits and roof expansion joint cover assemblies.

3.2 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections.

END OF SECTION 079513.16





## SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

### 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. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Louvers installed in hollow metal doors.
4. Light frames and glazing installed in hollow metal doors.

- B. Related Sections:

1. Division 01 Section "General Conditions".
2. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
3. Division 08 Section "Flush Wood Doors".
4. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
5. Division 08 Section "Door Hardware".
6. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

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

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. FEMA P-361 2015 – Design and Construction Guidance for Community Safe Rooms.
15. ICC 500 - 2014 ICC/NSSA Standard for the Design and Construction of Storm Shelters.
16. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
17. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
18. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
  1. Elevations of each door design.
  2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
  3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  4. Locations of reinforcement and preparations for hardware.
  5. Details of anchorages, joints, field splices, and connections.
  6. Details of accessories.
  7. Details of moldings, removable stops, and glazing.
  8. Details of conduit and preparations for power, signal, and control systems.
- D. Samples for Verification:
  1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

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- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
  - C. Fire-Rated Door Assemblies: Assemblies 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 UL10C (neutral pressure at 40" above sill) or UL 10C.
    - 1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
    - 2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
    - 3. Smoke Control Door Assemblies: Comply with NFPA 105.
      - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
  - D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.
  - E. Severe Storm Shelter Openings: Provide complete door systems for hurricane or tornado storm shelters, and other areas of refuge, complying and tested according to FEMA P-361, Third Edition (2015), Design and Construction Guidance for Community Safe Rooms; and ICC 500 (2014), ICC/NSSA Standard for the Design and Construction of Storm Shelters.
    - 1. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
  - F. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
  - B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

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- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
  - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:
  - 1. CECO Door Products (C).
  - 2. Curries Company (CU).

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

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- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

## 2.3 HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.
- B. Exterior Doors (Energy Efficient): Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model, ANSI/SDI A250.4 for physical performance level, and HMMA 867 for door construction.
  - 1. Design: Flush panel.
  - 2. Core Construction: Foamed in place polyurethane and steel stiffened laminated core with no stiffener face welds, in compliance with HMMA 867 "Laminated Core".
    - a. Provide 22 gauge steel stiffeners at 6 inches on-center internally welded at 5" on-center to integral core assembly, foamed in place polyurethane core chemically bonded to all interior surfaces. No stiffener face welding is permitted.
    - b. Thermal properties to rate at a fully operable minimum U-Factor 0.37 and R-Value 2.7, including insulated door, thermal-break frame and threshold.
    - c. Kerf Type Frames: Thermal properties to rate at a fully operable minimum U-Factor 0.38 and R-Value 2.6, including insulated door, kerf type frame, and threshold.
  - 3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053 inch - 1.3-mm) thick steel, Model 2.
  - 4. Vertical Edges: Vertical edges to be mechanically interlocked with hairline seam. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
  - 5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
  - 6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".
  - 7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Design: Flush panel.

- a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
2. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
3. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
4. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
5. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. Manufacturers Basis of Design:

1. CECO Door Products (C) Honeycomb Core - Regent Series.
2. Curries Company (CU) - Polystyrene Core - 707 Series.
3. Curries Company (CU) - Energy Efficient - 777 Trio-E Series.

## 2.4 HOLLOW METAL DOORS FOR SEVERE STORM SHELTERS

A. General: Provide complete tornado or hurricane resistant door and frame shelter assemblies constructed to resist the design wind pressures for components and cladding and missile impact loads as described in ICC 500 - 2014, ICC/NSSA Standard for the Design and Construction of Storm Shelters. Only single opening and paired opening doors and their frames constructed to resist calculated design wind pressures and laboratory tested missile impacts are acceptable.

1. Door systems, both single doors and paired openings, tested and complying with ICC 500 - 2014 and FEMA P-361 (2015), Design and Construction Guidance for Community Safe Rooms and supported by third party test results.
2. Sheets fabricated on exterior openings from commercial quality hot dipped zinc coated steel complying with ASTM A924 A60. Gauges to be in accordance with manufacturers tested assemblies.
3. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
4. Top Edge: Reinforce top of doors with a continuous steel channel extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached and welded in place with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".

B. Manufacturers Basis of Design:

1. CECO Door Products (C) - StormPro Series.
2. Curries Company (CU) - StormPro Series.

## 2.5 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Thermal Break Frames: Subject to the same compliance standards and requirements as standard hollow metal frames. Tested for thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400. Where indicated provide thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate with 1/16" positive thermal break and integral vinyl weatherstripping.
- C. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.
  - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
  - 2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
  - 3. Manufacturers Basis of Design:
    - a. CECO Door Products (C) – SU SR Series.
    - b. Curries Company (CU) – Thermal Break TQ Series.
- D. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
  - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
  - 2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
  - 3. Manufacturers Basis of Design:
    - a. Curries Company (CU) - M Series.
- E. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- F. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

## 2.6 FRAMES FOR SEVERE STORM SHELTERS

- A. General: Subject to the same compliance standards and requirements as standard hollow metal frames, provide complete tornado or hurricane resistant door and frame assemblies, for both single doors and paired openings, tested and labeled as complying with ICC 500 - 2014 and FEMA P-361 (2015) and supported by third party test results.
  - 1. Fabricate exterior frames from 14 gauge hot dipped zinc coated steel that complying with ASTM designations A924 A60.
  - 2. Manufacturers Basis of Design:
    - a. CECO Door Products (C) - StormPro Series.
    - b. Curries Company (CU) - StormPro Series.

## 2.7 FRAME ANCHORS

- A. Jamb Anchors:
  - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, 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 and not less than 0.042 inch thick.
  - 3. FEMA 361 Storm Shelter Anchors: Masonry T-shaped, wire masonry type, or existing opening type anchors.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

## 2.8 LOUVERS

- A. Metal Louvers: Unless otherwise indicated provide louvers to meet the following requirements.
  - 1. Blade Type: Vision proof inverted V or inverted Y.
  - 2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.
- B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.
  - 1. Manufacturers: Subject to compliance with requirements, provide louvers to meet rating indicated.
  - 2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

## 2.9 LIGHT OPENINGS AND GLAZING

- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.
- B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.



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- C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.
- D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.

## 2.10 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

## 2.11 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 thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Doors:
  - 1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
  - 2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
  - 3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
  - 4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
- D. Hollow Metal Frames:
  - 1. Shipping Limitations: 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.
  - 2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
    - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and

handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
9. Jamb Anchors: Provide number and spacing of anchors as follows:
  - a. Masonry 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) 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 1 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 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
    - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
  - c. Severe Storm Shelter Openings: Provide jamb, head, and sill anchors in accordance with manufacturer's tested and approved assemblies.
10. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
11. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT,

tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.

- E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
  - 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  - 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
  - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  - 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

## 2.12 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
  - 1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

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- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

### 3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
  - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
  - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
  - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
  - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
  - 1. Non-Fire-Rated Standard Steel Doors:
    - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
  - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

### 3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and

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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 and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

### 3.5 FIELD QUALITY CONTROL

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

END OF SECTION 081113



## SECTION 081416 - FLUSH WOOD DOORS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Solid-core doors with wood-veneer faces.
  - 2. Factory finishing flush wood doors.
  - 3. Factory fitting flush wood doors to frames and factory machining for hardware.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
  - 1. Indicate dimensions and locations of mortises and holes for hardware.
  - 2. Indicate dimensions and locations of cutouts.
  - 3. Indicate requirements for veneer matching.
  - 4. Indicate doors to be factory finished and finish requirements.
  - 5. Indicate fire-protection ratings for fire-rated doors.
- C. Samples for Initial Selection: For plastic-laminate door faces and factory-finished doors.
- D. Samples for Verification:
  - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors from single manufacturer.
- B. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."
  - 1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
    - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
  - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
  - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:



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1. Algoma Hardwoods, Inc.
2. Eggers Industries.
3. Graham; an Assa Abloy Group company.
4. Marshfield Door Systems, Inc.
5. Oshkosh Architectural Door Company.
6. VT Industries Inc.

## 2.2 DOOR CONSTRUCTION, GENERAL

- A. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.
- B. Mineral-Core Doors:
  1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
  2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
    - a. 5-inch top-rail blocking.
    - b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
    - c. 5-inch mid-rail blocking, in doors indicated to have armor plates.
    - d. 4-1/2-by-10-inch lock blocks, in doors indicated to have exit devices.
  3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

## 2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
  1. Grade: Premium, with Grade A faces.
  2. Species: White oak.
  3. Cut: Plain sliced.
  4. Match between Veneer Leaves: Book match.
  5. Assembly of Veneer Leaves on Door Faces: Running match.
  6. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.

## 2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

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1. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
  1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
  2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

## 2.5 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. Finish doors at factory.
- C. Use only paints and coatings that 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. Transparent Finish:
  1. Grade: Premium.
  2. Finish: As selected by Architect from Manufacturers Standard Colors.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
  1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."

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- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416



## SECTION 085313 - VINYL WINDOWS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes vinyl-framed windows.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

#### 1.4 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace vinyl windows that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period:
    - a. Window: 10 years from date of Substantial Completion.
    - b. Glazing Units: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
  - 1. Window Certification: WDMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

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1. Minimum Performance Class: LC.
2. Minimum Performance Grade: 25.

## 2.2 VINYL WINDOWS

- A. Basis of Design: Pella 250 Series, Sliding Windows, Manufactured by Pella Corporation
- 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. Andersen Window Co.
  2. Gerkin Windows & Doors.
  3. JELD-WEN, Inc.
  4. Pella Corporation.
- C. Operating Types: As indicated on Drawings.
- D. Frames and Sashes: Impact-resistant, UV-stabilized PVC complying with AAMA/WDMA/CSA 101/I.S.2/A440.
  1. Finish: Integral color, white.
  2. Gypsum Board Returns: Provide at interior face of frame.
- E. Glass: Clear annealed glass, ASTM C1036, Type 1, Class 1, q3, Low E Coated.
  1. Kind: Fully tempered where indicated on Drawings.
- F. Insulating-Glass Units: ASTM E2190.
  1. Glass: ASTM C1036, Type 1, Class 1, q3, Low E Coated.
    - a. Tint: Clear.
    - b. Kind: Fully tempered where indicated on Drawings.
  2. Lites: Two.
  3. Filling: Fill space between glass lites with argon.
  4. Low-E Coating: Sputtered on second surface.
- G. Hardware, General: Provide manufacturer's standard corrosion-resistant hardware sized to accommodate sash weight and dimensions.
  1. Exposed Hardware Color and Finish: As indicated by manufacturer's designations.
  2. Single-Handle Locking System: Operates positive-acting arms that pull sash into locked position. Provide one arm on sashes up to 29 inches tall and two arms on taller sashes.

- H. Horizontal-Sliding Window Hardware:
  - 1. Sill Cap/Track: Designed to comply with performance requirements indicated and to drain to the exterior.
  - 2. Locks and Latches: Operated from the inside only.
  - 3. Roller Assemblies: Low-friction design.
- I. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- J. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

## 2.3 INSECT SCREENS

- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
  - 1. Type and Location: Full, outside for sliding sashes.
- B. Aluminum Frames: Complying with SMA 1004 or SMA 1201.
  - 1. Finish for Interior Screens: Baked-on organic coating in color selected by Architect from manufacturer's full range.
  - 2. Finish for Exterior Screens: Baked-on organic coating in color selected by Architect from manufacturer's full range.

## 2.4 FABRICATION

- A. Fabricate vinyl windows in sizes indicated. Include a complete system for installing and anchoring windows.
- B. Glaze vinyl windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Hardware: Mount hardware through double walls of vinyl extrusions or provide corrosion-resistant reinforcement.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.
- B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- D. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.
- E. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 085313



## SECTION 087100 - DOOR HARDWARE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
  - 1. Swinging doors.
  - 2. Sliding doors.
- B. Door hardware includes, but is not necessarily limited to, the following:
  - 1. Mechanical door hardware.
  - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
  - 1. Division 08 Section "Hollow Metal Doors and Frames".
  - 2. Division 08 Section "Flush Wood Doors".
  - 3. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
  - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
  - 2. FEMA P-361 2015/2021 - Design and Construction Guidance for Community Safe Rooms.
  - 3. ICC 500-2014/2020, ICC/NSSA Standard for the Design and Construction of Storm Shelters.
  - 4. ICC/IBC - International Building Code.
  - 5. NFPA 70 - National Electrical Code.
  - 6. NFPA 80 - Fire Doors and Windows.
  - 7. NFPA 101 - Life Safety Code.
  - 8. NFPA 105 - Installation of Smoke Door Assemblies.
  - 9. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
  - 1. ANSI/BHMA Certified Product Standards - A156 Series.

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2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.
4. UL 305 - Panic Hardware.
5. ANSI/UL 437- Key Locks.

### 1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
  2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
  3. Content: Include the following information:
    - a. Type, style, function, size, label, hand, and finish of each door hardware item.
    - b. Manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    - e. Explanation of abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for door hardware.
    - g. Door and frame sizes and materials.
    - h. Warranty information for each product.
  4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Proof of Qualification: Provide copy of manufacturer(s) Factory Trained Installer documentation indicating proof of status as a qualified installer of tornado or hurricane storm shelter assemblies.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in

electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

#### 1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

E. Storm Shelter Impact Protective Assembly Installer Qualifications: Installers are to be factory trained for shop and field installation prior to project bid, and are responsible for commissioning, servicing, and warranting the installed equipment specified for the project. A pre-installation site inspection of the frame and floor conditions shall be conducted by the factory trained installer prior to any Storm Shelter Impact Protective assembly hardware applied to the opening.

F. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

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- G. Storm Shelter Openings: Provide complete door systems for hurricane or tornado resistant storm shelters and other areas of refuge complying and tested according to ICC 500 (2014/2020), ICC/NSSA Standard for the Design and Construction of Storm Shelters.
  - H. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
  - I. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
    - 1. Function of building, purpose of each area and degree of security required.
    - 2. Plans for existing and future key system expansion.
    - 3. Requirements for key control storage and software.
    - 4. Installation of permanent keys, cylinder cores and software.
    - 5. Address and requirements for delivery of keys.
  - J. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
    - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
    - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
    - 3. Review sequence of operation narratives for each unique access controlled opening.
    - 4. Review and finalize construction schedule and verify availability of materials.
    - 5. Review the required inspecting, testing, commissioning, and demonstration procedures
  - K. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
  - B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

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- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

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

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door

Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

## 2.2 BUTT HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
  1. Quantity: Provide the following hinge quantity:
    - a. Two Hinges: For doors with heights up to 60 inches.
    - b. Three Hinges: For doors with heights 61 to 90 inches.
    - c. Four Hinges: For doors with heights 91 to 120 inches.
    - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
  2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
    - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
    - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
  3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
    - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
    - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
  4. Hinge Options: Comply with the following:
    - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
  5. Manufacturers:
    - a. McKinney (MK) - TA/T4A Series, 5 knuckle.

## 2.3 CONTINUOUS HINGES

- A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
  - 1. Manufacturers:
    - a. Pemko (PE).
  
- B. Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 Grade 1-600 pin and barrel continuous hinges with minimum 14 gauge Type 304 stainless steel hinge leaves, concealed stainless pin, and twin self-lubricated nylon bearings at each knuckle separation. Factory trim hinges to suit door height and prepare for electrical cut-outs.
  - 1. Manufacturers:
    - a. Markar Products; ASSA ABLOY Architectural Door Accessories (MR).
  - 2. Manufacturers (Storm Shelter Assemblies):
    - a. Markar Products; ASSA ABLOY Architectural Door Accessories (MR).
    - b. No Substitution.

## 2.4 SLIDING AND FOLDING HARDWARE

- A. Sliding and Folding Door Hardware: Hardware is to be of type and design as specified and should conform with ANSI/BHMA A156.14.
  - 1. Pocket Sliding Door Hardware: Rated for doors weighing up to 200 lb.
  - 2. Manufacturers:
    - a. Hafele Manufacturing (HF).
    - b. Pemko (PE).

## 2.5 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
  - 1. Manufacturers:
    - a. Sargent Manufacturing (SA).
    - b. No Substitution.

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- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
  - 1. Threaded mortise cylinders with rings and cams to suit hardware application.
  - 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  - 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
  - 4. Tubular deadlocks and other auxiliary locks.
  - 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
  - 6. Keyway: Match Facility Standard.
- C. Keying System: Each type of lock and cylinders to be factory keyed.
  - 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
  - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
  - 3. Existing System: Field verify and key cylinders to match Owner's existing system.
- D. Key Quantity: Provide the following minimum number of keys:
  - 1. Change Keys per Cylinder: Two (2)
  - 2. Master Keys (per Master Key Level/Group): Five (5).
  - 3. Construction Keys (where required): Ten (10).
- E. Construction Keying: Provide construction master keyed cylinders.
- F. Key Registration List (Bitting List):
  - 1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
  - 2. Provide transcript list in writing or electronic file as directed by the Owner.

## 2.6 KEY CONTROL

- A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
  - 1. Manufacturers:
    - a. Lund Equipment (LU).
    - b. MMF Industries (MM).
    - c. Telkee (TK).



## 2.7 MORTISE LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all features and functionality as specified herein.
1. Manufacturers:
    - a. Sargent Manufacturing (SA) - 8200 Series.
    - b. No Substitution.

## 2.8 MULTI-POINT LOCKS AND LATCHING DEVICES

- A. Multi-Point Locksets, Storm Shelter: ANSI/BHMA A156.37, Certified Products Directory (CPD) listed three-point locking system device engineered for in-swinging and out-swinging door applications on windstorm safe shelter rooms. Extra heavy duty steel component construction securing the door to the frame at top, bottom and center latch positions. All three latching points are automatically activated when the device is locked. Multi-Point Deadlocking System shall be used only with doors, frames and associated hardware that have been engineered, tested and approved for a complete opening assembly system.
1. Storm Shelter Components: Multi-point locking system devices engineered for in-swinging and out-swinging door applications on tornado or hurricane shelter rooms. The multi-point latching integrated device is approved for usage as part of a complete ICC 500 (2014/2020) and FEMA P-361 (2015/2021) door, frame and hardware assembly.
  2. ANSI-BHMA listed to A156.37 Grade 1 for multi-point locks:
    - a. Lever torque to retract all bolts less than 28 in.lb.
    - b. Cycle tested to 1,000,000 cycles.
  3. NFPA 80 and NFPA 101 life safety requirements.
  4. UL10C, 3-hour fire rated openings.
  5. Latchbolt Construction:
    - a. Center Bolt to be one piece,  $\frac{3}{4}$ " throw anti-friction stainless steel latch and one piece, 1" throw, hardened stainless steel deadbolt; 2-3/4" standard backset.
    - b. Top and Bottom Bolts to be  $\frac{3}{4}$ " x  $\frac{3}{4}$ " stainless steel square latchbolt with  $\frac{3}{4}$ " projection.
  6. Independent top and bottom bolt projection shall be field adjustable:
    - a. From the center mortise pocket.
    - b. Ability to make field adjustments while the door is in the hung position without the removal of the door.

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- c. Top and Bottom Bolts and the Center Mortise Case shall be factory installed into the door assembly.
7. Bottom strike shall be offset and reversible to accommodate alignment issues due to rough opening tolerances.
8. Devices must be able to accommodate sectional rose and lever trim to match the design style and architectural finishes of the balance of the lockset and latches as specified.
9. Devices must be available with electronic access control options for higher or everyday use and traceability.
10. Devices must be available with rod-dogging indicator options:
  - a. Operated by single-point latching for non-emergency or normal use of the space.
  - b. Ability to hold rods in a retracted state.
  - c. Day-to-day operations with mortise lock only.
  - d. Indicator to show status.
11. Manufacturers:
  - a. Sargent Manufacturing (SA) - FM7300 Series.
  - b. No Substitution.

## 2.9 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
  1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
  2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
  3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
  4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
  1. Strikes for Mortise Locks and Latches: BHMA A156.13.
  2. Strikes for Bored Locks and Latches: BHMA A156.2.
  3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
  4. Dustproof Strikes: BHMA A156.16.

## 2.10 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
1. Exit devices shall have a five-year warranty.
  2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
  3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
  4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
  5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
  6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
  7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
  8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
  9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
  10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
  11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
  12. Hurricane and Storm Shelter Compliance: Devices to be U.L. listed for windstorm assemblies where applicable. Provide the appropriate hurricane or storm shelter products that have been independently third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Manufacturers:

- a. Sargent Manufacturing (SA) - 80 Series.
  - b. No Substitution.
- C. Multi-Point Exit Devices for Storm Shelter Openings: Multi-point exit devices specifically engineered for out-swinging door applications on tornado or hurricane resistant storm shelter openings. Extra heavy duty steel component construction with each of the latching points automatically activated when the device is locked. The multi-point exit device is approved for usage as part of a complete ICC 500 (2014/2020) and FEMA P-361 (2015/2021) door, frame and hardware assembly.
1. Manufacturers:
    - a. Sargent Manufacturing (SA) - FM8700 Series.
    - b. No Substitution.

## 2.11 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
  2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
  3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
  4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
  6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
  7. Storm Shelter Compliance: Door closers to be U.L. listed for windstorm assemblies where applicable. Provide the appropriate storm shelter products that have been independently third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.
- B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.

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1. Large body cast iron surface mounted door closers shall have a 30-year warranty.
2. Manufacturers:
  - a. Sargent Manufacturing (SA) - 281 Series.
  - b. No Substitution.

## 2.12 ARCHITECTURAL TRIM

### A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
  - a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
  - a. Rockwood (RO).

## 2.13 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
  1. Manufacturers:
    - a. Rockwood (RO).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as

indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:
  - a. Norton Rixson (RF).
  - b. Sargent Manufacturing (SA).

## 2.14 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
  1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
  1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
  1. Pemko (PE).

## 2.15 FABRICATION

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

## 2.16 FINISHES

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

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

### 3.3 INSTALLATION

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

3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
  4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

### 3.4 FIELD QUALITY CONTROL

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

### 3.5 ADJUSTING

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

### 3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.



- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

### 3.7 DEMONSTRATION

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

### 3.8 DOOR HARDWARE SETS

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

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

- B. Manufacturer's Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. MR - Markar
4. SU - Securitron
5. RO - Rockwood
6. SA - SARGENT
7. TC - Trimco
8. RF - Rixson
9. NO - Norton
10. OT - Other

### **Hardware Sets**

#### **Set: 1.0**

Doors: [013A](#)

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1 Continuous Hinge	HG305 x Height Required	630	MR
1 Multipoint Exit Device	12 FM8706 ETL	US32D	SA
1 Surface Closer	TB 281 CPS	EN	SA
1 Door Stop	462	US2C	RO
1 Gasketing	S773BL		PE
1 Rain Guard	346C		PE
1 Sweep	345ANB		PE
1 Threshold	1715A		PE

Notes: Cutout threshold so bottom strike can be mounted to concrete floor and not on the threshold.

**Set: 2.0**

Doors: 001

1 Continuous Hinge	CFM83HD1 x Height Required		PE
1 Surface Vert Rod Exit, Classroom	NB8713 ETL	US32D	SA
1 Surf Overhead Stop	9-x36	630	RF
1 Door Closer	281 PD10	EN	SA
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO
1 Gasketing	2891APK TKSP8		PE
1 Sweep	3452CNB TKSP8		PE
1 Threshold	253x3AFG		PE

Notes: Door normally closed, latched and secured.  
Entry by lever when unlocked by key in exit device trim.  
Free egress at all times.

**Set: 3.0**

Doors: 002

1 Continuous Hinge	KCFM83-HD1 x Height Required		PE
1 Dummy Push Bar	8893	US32D	SA
1 Exit Device Dummy Trim	710ETL	US26D	SA
1 Door Closer	281 P10	EN	SA
1 Drop Plate	281D	EN	SA
1 Blade Stop Spacer	581-2	EN	SA
1 Wall Stop	400	US26D	RO

**Set: 4.0**

Doors: 017B, 017C

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3 Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1 Classroom Lock	8237 LNL	US26D	SA
1 Door Closer	281 O	EN	SA
1 Kick Plate	K1050 10" x 2" LDW CSK BEV	US32D	RO
1 Wall Stop	400	US26D	RO
3 Silencer	608-RKW		RO

**Set: 5.0**

Doors: 013

1 Continuous Hinge	HG305 x Height Required	630	MR
1 Multi-Point Lock	FM7325 OL 188	US26D	SA
1 Surface Closer	TB 281 O	EN	SA
1 Kick Plate	K1050 WS 10" x 2" LDW CSK BEV	US32D	RO
1 Wall Stop	400	US26D	RO
1 Gasketing	S773BL		PE

**Set: 6.0**

Doors: 012A

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Storeroom Lock	8204 LNL	US26D	SA
1 Surf Overhead Stop	9-x36	630	RF
3 Silencer	608-RKW		RO

**Set: 7.0**

Doors: 003, 005, 006, 014, 015

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Office Lock	8205 LNL	US26D	SA
1 Wall Stop	400	US26D	RO
3 Silencer	608-RKW		RO

**Set: 8.0**

Doors: 012

3 Hinge, Full Mortise	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Passage Set	8215 LNL	US26D	SA

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1 Wall Stop 400 US26D RO

**Set: 9.0**

Doors: 011

3 Hinge, Full Mortise, Hvy Wt T4A3786 4-1/2" x 4-1/2" US26D MK  
 1 Passage Set 8215 LNL US26D SA  
 1 Surface Closer w/ Hold Open 281 H EN SA  
 1 Armor Plate K1050 34" x 2" LDW CSK BEV US32D RO  
 1 Wall Stop 400 US26D RO  
 3 Silencer 608-RKW RO

**Set: 10.0**

Doors: 008, 009

3 Hinge, Full Mortise, Hvy Wt T4A3786 4-1/2" x 4-1/2" US26D MK  
 1 Privacy Set w/ Indicator V21 EMB 8265 LNL US26D SA  
 1 Door Closer 281 O EN SA  
 1 Kick Plate K1050 10" x 2" LDW CSK BEV US32D RO  
 1 Wall Stop 400 US26D RO  
 3 Silencer 608-RKW RO

**Set: 11.0**

Doors: 004, 005B

1 Track System CS-W60 x Size Required PE  
 2 Door Pull BF 111 Mtg-Type 5 US32D RO

Mark	Hardware
001	2.0
002	3.0
003	7.0
004	11.0
005	7.0
005B	11.0

006	7.0
008	10.0
009	10.0
011	9.0
012	8.0
012A	6.0
013	5.0

013A	1.0
014	7.0
015	7.0
017B	4.0
017C	4.0

END OF SECTION 087100

## SECTION 088000 - GLAZING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section includes:

1. Glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
  - a. Doors.
  - b. Storefront framing.
  - c. Glazed entrances.
  - d. Interior borrowed lites.

B. Scope includes:

1. Monolithic float glass for interior frames and doors.
2. Insulating 1-inch thick Low-E glass for new storefront frames, doors and curtain walls.

C. Related Sections

1. Section 81 11 13 – Hollow Metal Doors and Frames
2. Section 08 14 16 – Flush Wood Doors

#### 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.

### 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.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. 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. 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.

## 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.
- 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.

## PART 2 - PRODUCTS

### 2.1 GLASS PRODUCTS, GENERAL

- A. **Thickness:** Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
- B. **Strength:** Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. **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.
  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. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

## 2.3 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
  - 1. Sealing System: Dual seal.
  - 2. Spacer: Manufacturer's standard spacer material and construction .

## 2.4 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.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene EPDM silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
  - 1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

## 2.5 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.



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3. Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
- C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
- D. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
- E. Glazing Sealant: Acid-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

## 2.6 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 804.3 tape, where indicated.
  2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
  2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

## 2.7 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

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- 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).
- E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- F. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

## 2.8 MONOLITHIC-GLASS TYPES

- A. Products: Subject to compliance with requirements, provide one of the following:
  - 1. AFG Industries, Inc.
  - 2. Cardinal Glass Industries.
  - 3. Oldcastle Building Envelope Glass
  - 4. Pilkington North America.
  - 5. PPG Industries, Inc.; SunClean.
  - 6. Or approved manufacturer.
- B. Glass Type GL-2: Clear fully tempered float glass.
  - 1. Thickness: 6.0 mm.
  - 2. Provide safety glazing labeling.

## 2.9 INSULATING-GLASS TYPES

- A. Products: Subject to compliance with requirements, provide one of the following:
  - 1. Cardinal Glass Industries.
  - 2. Guardian Glass
  - 3. Oldcastle Building Envelope Glass
  - 4. Pilkington North America.
  - 5. PPG Industries, Inc.; SunClean.
  - 6. Viracon, Inc.

7. Or approved manufacturer.
- B. Glass Type GL-1: Low-e-coated, fully tempered, clear insulating glass.
1. Overall Unit Thickness: 1 inch.
  2. Outdoor Lite: 1/4-inch tempered, Clear, Low-E #2.
  3. Interspace Content: Argon.
  4. Indoor Lite: 1/4-inch clear tempered
  5. Low-E Coating: Second surface.
  6. Visible Light Transmittance: clear.
  7. Winter Nighttime U-Factor: 0.24 maximum.
  8. Solar Heat Gain Coefficient: Clear.

### 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.
- 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. Apply heel bead of elastomeric sealant.
- F. 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.
- G. Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.3 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer. E. Install gaskets so they protrude past face of glazing stops.

### 3.4 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

### 3.5 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 089516 - WALL VENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes wall vents.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of metal finish required.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranties.

#### 1.4 WARRANTY

- A. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked enamel, powder coat, or organic finishes within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 WALL VENTS

- A. Extruded-Aluminum Wall Vents:
  - 1. Extruded-aluminum louvers and frames, not less than 0.125-inch nominal thickness, assembled by welding; with 18-by-14-mesh, aluminum insect screening on inside face.
  - 2. Finish: Mill.

## 2.2 MATERIALS

- A. Aluminum Extrusions: ASTM B221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Protect unpainted surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint.

END OF SECTION 089516



## SECTION 092900 - GYPSUM BOARD

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

#### 1.2 ACTION SUBMITTALS

A. Product Data:

1. Gypsum wallboard.
2. Gypsum board, Type X.
3. Gypsum ceiling board.
4. Mold-resistant gypsum board.
5. Cementitious backer units.
6. Joint treatment materials.
7. Sound-attenuation blankets.
8. Acoustical sealant.

B. Samples: For each texture finish indicated on same backing indicated for Work.

### 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 E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

#### 2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

## 2.3 INTERIOR GYPSUM BOARD

### A. Gypsum Board, Type X: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Gypsum.
  - b. Certainteed; SAINT-GOBAIN.
  - c. Georgia-Pacific Gypsum LLC.
  - d. National Gypsum Company.
  - e. USG Corporation.
2. Thickness: 5/8 inch.
3. Long Edges: Tapered.

### B. Gypsum Ceiling Board: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Gypsum.
  - b. Certainteed; SAINT-GOBAIN.
  - c. Georgia-Pacific Gypsum LLC.
  - d. National Gypsum Company.
2. Thickness: 1/2 inch.
3. Long Edges: Tapered.

### C. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. American Gypsum.
  - b. Certainteed; SAINT-GOBAIN.
  - c. Georgia-Pacific Gypsum LLC.
  - d. National Gypsum Company.
  - e. USG Corporation.
2. Core: 5/8 inch, Type X.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

## 2.4 TILE BACKING PANELS

1. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
- B. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Certainteed; SAINT-GOBAIN.
  - b. National Gypsum Company.
  - c. USG Corporation.
2. Thickness: 5/8 inch.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

## 2.5 TRIM ACCESSORIES

### A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
  - a. Cornerbead.
  - b. Bullnose bead.
  - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
  - d. L-Bead: L-shaped; exposed long flange receives joint compound.
  - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
  - f. Expansion (control) joint.
  - g. Curved-Edge Cornerbead: With notched or flexible flanges.

## 2.6 JOINT TREATMENT MATERIALS

### A. General: Comply with ASTM C475/C475M.

### B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. 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, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use 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.

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5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

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.

## 2.7 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

- B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

1. Use screws complying with ASTM C954 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.

- C. Sound-Attenuation Blankets: ASTM C665, 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.

- D. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

- E. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."

## PART 3 - EXECUTION

### 3.1 INSTALLATION AND FINISHING OF PANELS

- A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

- B. Comply with ASTM C840.

- 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.

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- E. Prefill open joints, rounded or beveled edges, 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 C840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 2: Panels that are substrate for tile Panels that are substrate for acoustical tile.
  - 3. Level 3: Where indicated on Drawings.
  - 4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
    - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- H. Cementitious Backer Units: Finish according to manufacturer's written instructions.

### 3.2 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 095113 - ACOUSTICAL PANEL CEILINGS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in original, unopened packages and store them in an enclosed and conditioned space protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Allow acoustical panels to reach room temperature and a stabilized moisture content before installing.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

#### 1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

#### 1.5 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them.

#### 1.6 EXTRA MATERIALS

- A. Furnish full-size, matching, acoustical ceiling panels equal to five percent of each quantity installed, in original packaging with protective covering for storage, and are identified with labels describing contents. Store in area directed by Owner.

## PART 2 - PRODUCTS

### 2.1 CEILING PANELS

#### A. Acoustical Ceiling Panels (ACP):

1. Products: Provide one of the following:
  - a. Armstrong World Industries, Inc.
  - b. CertainTeed
  - c. USG Interiors, Inc.,
2. Tile Edge: Based on Armstrong Cirrus #589 HRC
3. Type II, Form 2
4. Pattern: CDFI
5. Color: White.
6. Edge" SLT
7. Size: 24"x 24"x 3/4"

#### B. Acoustical Ceiling Panels (ACP – Moisture Resistant):

1. Products: Provide one of the following:
  - a. Armstrong World Industries, Inc.
  - b. CertainTeed
  - c. USG Interiors, Inc.,
2. Tile Edge: Based on Armstrong Cirrus #589 HRC, Humiguard Plus.
3. Type II, Form 2
4. Pattern: CDFI
5. Color: White.
6. Edge: SLT
7. Size: 24"x 24"x 3/4"

### 2.2 SUSPENSION SYSTEMS

#### A. Suspension System:

1. Products: Provide one of the following:
  - a. Armstrong World Industries, Inc
  - b. CertainTeed
  - c. Chicago Metallic Corporation
  - d. USG Interiors, Inc.
2. Width: Based on Armstrong Prelude XL., DX System.
3. Color: White.
4. Use corrosion resistant grid in high moisture areas.
5. Provide Axiom trim on all exposed edges.



### 2.3 METAL SUSPENSION SYSTEM ACCESSORIES

- A. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.
  - 1. Fasteners: Do not use powder-actuated fasteners for attaching items to precast, concrete, or masonry.
- B. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
  - 1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
  - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but not less than 12 gauge wire.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

### 3.3 INSTALLATION, GENERAL

- A. General: Comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension

members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors that extend through forms into concrete.
  6. Do not attach hangers to steel deck tabs.
  7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  8. Space hangers not more than 48 inches O.C. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
  2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension system runners square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. Directional Panels: Install with pattern running in one direction parallel to long axis of space.

### 3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

## SECTION 096513 - RESILIENT BASE AND ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Resilient base.
  - 2. Resilient molding accessories.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

#### 1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

#### 1.4 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- C. Install resilient products after other finishing operations, including painting, have been completed.

### PART 2 - PRODUCTS

#### 2.1 RESILIENT BASE

- A. Resilient Base:

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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. [Burke Mercer Flooring Products; Division of Burke Industries, Inc.](#)
- b. [Flexco, Inc.](#)
- c. [Johnsonite.](#)
- d. [Roppe Corporation, USA.](#)

- B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TV (vinyl, thermoplastic).
2. Manufacturing Method: Group I (solid, homogeneous).
3. Style: Cove (base with toe).

- C. Minimum Thickness: 0.125 inch.

- D. Height: 4 inches.

- E. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.

- F. Outside Corners: Job formed or preformed.

- G. Inside Corners: Job formed or preformed.

- H. Finish: As selected by Architect from manufacturer's full range.

- I. Colors and Patterns: As selected by Architect from full range of industry colors.

## 2.2 RESILIENT MOLDING ACCESSORY

- A. Resilient Molding Accessory:

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:

- a. [Burke Mercer Flooring Products; Division of Burke Industries, Inc.](#)
- b. [Flexco, Inc.](#)
- c. [Johnsonite.](#)
- d. [Roppe Corporation, USA.](#)

- B. Description: Transition strips.

- C. Material: Rubber.

- D. Profile and Dimensions: As indicated.

- E. Colors and Patterns: As selected by Architect from full range of industry colors.

## 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Accessories: Prepare according to ASTM F 710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
  - 4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until they are same temperature as the space where they are to be installed.
  - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

### 3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

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- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.

3.3 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet, resilient floor covering that would otherwise be exposed.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Cover resilient products until Substantial Completion.

END OF SECTION 096513

## SECTION 096519 - RESILIENT TILE FLOORING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. LVT composition floor tile.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
- C. Samples: Full-size units of each color and pattern of floor tile required.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.4 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor tile.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

### PART 2 - PRODUCTS

#### 2.1 VINYL COMPOSITION FLOOR TILE

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

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- B. Basis of Design: Mohawk Group, Commercial Luxury Vinyl Tile. Architect reserves the right to change to a tile of similar cost & size.
  - 1. Style: Stonework #C0179
  - 2. Color: Antique Finish #870
  - 3. Collection: Living Local
  - 4. Size: 12" x 24"

## 2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
- C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
  - 4. Moisture Testing: Perform tests recommended by floor covering manufacturer. Proceed with installation only after substrates pass testing.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are same temperature as space where they are to be installed.
  - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.



- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

### 3.2 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
  - 1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
  - 1. Lay tiles with grain running in one direction.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

### 3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
  - 1. Apply two coat(s).
- C. Cover floor tile until Substantial Completion.

END OF SECTION 096519



## SECTION 096813 - TILE CARPETING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Modular carpet tile.

#### 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 carpet tile installation, plans showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

- C. Samples: For each exposed product and for each color and texture required.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

- B. Sample warranty.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.7 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Mohawk Group - Modular Tuff Stuff II**.
- B. Color: 989 Obsidian.
- C. Pattern: Step Up II.
- D. Size: 24x24

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Concrete Slabs:
  - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

- b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
  - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- B. Wood Subfloors: Verify that underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
  - C. Metal Subfloors: Verify that underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
  - D. Painted Subfloors: Perform bond test recommended in writing by adhesive manufacturer.
    - 1. Access Flooring Systems: Verify access floor substrate is compatible with carpet tile and adhesive, if any, and underlayment surface is gaps greater than 1/8 inch and protrusions more than 1/32 inch.

### 3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

### 3.3 INSTALLATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.

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- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns indicated on Drawings.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.
- I. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

## SECTION 099123 - INTERIOR PAINTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
  - 1. Steel.
  - 2. Gypsum board
  - 3. Concrete Block.

#### 1.2 DEFINITIONS

- A. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples: For each type of paint system and in each color and gloss of topcoat.
- C. Product List: For each product indicated. Include printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

#### 1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include but are not limited to products listed in other Part 2 articles for the paint category indicated.

### 2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. 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:
  - 1. Colors to be selected by the architect from the Sherwin Williams standard catalog of colors.

### 2.3 PRIMERS/SEALERS

- A. Primer Sealer, Interior, Institutional Low Odor/VOC: MPI #149.
  - 1. Sherwin Williams or approved equal.
- B. Interior/Exterior Latex Block Filler: Water-based, high-solids, emulsion coating formulated to bridge and fill porous surfaces of exterior concrete masonry units in preparation for specified subsequent coatings.
  - 1. Sherwin Williams or approved equal.

### 2.4 METAL PRIMERS

- A. Primer, Alkyd, Anti-Corrosive, for Metal: MPI #79.
  - 1. Sherwin Williams or approved equal.

### 2.5 WATER-BASED PAINTS

- A. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 3): MPI #144.
  - 1. Sherwin Williams or approved equal.



### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Concrete: 12 percent.
  - 2. Masonry (Clay and CMU): 12 percent.
  - 3. Wood: 15 percent.
  - 4. Gypsum Board: 12 percent.
  - 5. Plaster: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

#### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI 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 re-prime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

#### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

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- B. 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.

### 3.4 CLEANING AND PROTECTION

- A. 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.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.5 INTERIOR PAINTING SCHEDULE

#### A. Steel Substrates: Eg-Shel/Satin Finish

##### 1. Low-Odor/VOC Latex System:

- a. 1st Coat: S-W Pro Industrial Pro-Cryl Primer, B66-310 Series (2-4 mils dry).
- b. 2nd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B-20-2600 Series.
- c. 3rd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B-20-2600 Series. (4-mils wet – 1.6 mils dry per coat)

#### B. Gypsum Board & Concrete Block Substrates: Eg-Shel/Satin Finish

##### 1. Low-Odor/VOC Latex System:

- a. 1st Coat: S-W Harmony Low Oder Interior Latex Primer, B11.(4 mils wet, 1.5 dry).
- b. 2nd Coat: S-W Harmony Low Oder Interior Latex Eg-Shel, B-9 Series.
- c. 3rd Coat: S-W Harmony Low Oder Interior Latex Eg-Shel, B-9 Series. (4 mils wet, 1.6 mils dry per coat)

END OF SECTION 099123

## SECTION 099300 - STAINING AND TRANSPARENT FINISHING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes surface preparation and application of wood stains and transparent finishes on the following substrates:
  - 1. Interior Substrates:
    - a. Dressed lumber (finish carpentry or woodwork).

#### 1.2 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.

#### 1.3 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.
- B. Samples: For each type of finish system and in each color and gloss of finish required.

#### 1.4 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.

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- 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.

## 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. Benjamin Moore & Co.
  2. Coronado Paint; Benjamin Moore Company.
  3. Diamond Vogel Paints.
  4. Dulux (formerly ICI Paints); a brand of AkzoNobel.
  5. Glidden Professional.
  6. Sherwin Williams
- B. Basis-of-Design Product: Subject to compliance with requirements, provide products indicated in wood finish systems schedules or comparable products by one of the following:
1. Sherwin Williams.
- C. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include but are not limited to products 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: Per manufacturer's recommendations.
- 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.

#### 3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

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- 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. 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.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

END OF SECTION 099300

## SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Public-use washroom accessories.
  - 2. Private use washroom accessories.
  - 3. Private use shower room accessories.
  - 4. Hand dryers
  - 5. 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.
- B. 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.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

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.

1.8 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- C. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- D. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- E. 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.
- F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- G. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.



- H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

## 2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
6. Tubular Specialties Manufacturing, Inc.

- B. Toilet Tissue (Roll) Dispenser: TP-1:

1. Basis-of-Design Product: American Specialties Inc.: - Model 0264-1A.
2. Description: Surface mounted, double roll dispenser.
3. Mounting: Surface mounted.
4. Operation: Spindle type with free delivery.
5. Capacity: Designed for 4-1/2- or 5-inch-diameter tissue rolls.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

- C. Waste Receptacle: WR-1:

1. Basis-of-Design Product: American Specialties Inc. – Model 0839.
2. Mounting: Free-standing.
3. Minimum Capacity: 19 gals.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Liner: Hooks for vinyl liners by end user.
6. Top Cover: Stainless Steel w/ opening.

- D. Liquid-Soap Dispenser: SD-1:

1. Basis-of-Design Product: American Specialties Inc. – Model 0347.
2. Description: Designed for dispensing soap in liquid or lotion form.
3. Mounting: Vertically oriented, surface mounted.
4. Capacity: 40 oz.
5. Materials: Stainless Steel.
6. Hinged stainless steel door on top of unit for refill.
7. Refill Indicator: Sight gauge.

- E. Grab Bar

1. Basis-of-Design Product: American Specialties Inc. – Model 3800.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
  - a. Finish: Smooth, No. 4 finish (satin).

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4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: As indicated on Drawings.

F. Mirror Unit: M-1

1. Basis-of-Design Product: American Specialties Inc.: - Model 0600
2. Frame: Stainless-steel channel.
  - a. Corners: Mitered, Welded, and ground smooth.
3. Integral Shelf: None.
4. Size: 24" x 36".

2.3 PRIVATE-USE BATHROOM ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bobrick Washroom Equipment, Inc.
4. Bradley Corporation.
5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
6. Tubular Specialties Manufacturing, Inc.

B. Private-Use Shower Curtain Rod: SCR-1:

1. Basis-of-Design Product: American Specialties Inc. – Model 3800.
2. Description: 1-1/4-inch- outside diameter, straight rod.
3. Configuration: As indicated on Drawings
4. Mounting Flanges: Designed for concealed fastening, in manufacturer's standard material and finish.
5. Rod Material and Finish: Stainless steel, 18 ga., alloy 18-8, ASTM A304, No. 4 finish (satin).
6. Use with 1200-SHU Curtain Hooks.

C. Private-Use Folding Shower Seat: SS-1:

1. Basis-of-Design Product: American Specialties Inc. – Model 8208.
2. Configuration: L-shaped seat, designed for wheelchair access.
3. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Architect.
4. Mounting Mechanism: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
5. Dimensions: 33" x 23".
6. ).
7. Electrical Requirements: 110 V, 14.6 A, 1600 W.

## 2.4 CUSTODIAL ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - 1. A & J Washroom Accessories, Inc.
  - 2. American Specialties, Inc.
  - 3. Bobrick Washroom Equipment, Inc.
  - 4. Bradley Corporation.
  - 5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
  - 6. Tubular Specialties Manufacturing, Inc.
- C. Mop and Broom Holder: MH-1
  - 1. Basis-of-Design Product: American Specialties Inc. – Model 8215.
  - 2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
  - 3. Length: 36 inches.
  - 4. Hooks: Three.
  - 5. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
  - 6. 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, when tested according to ASTM F 446.

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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 104416 - FIRE EXTINGUISHERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

#### 1.5 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.
- C. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

#### 1.6 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 fire protection cabinet and mounting bracket 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. J. L. Industries, Inc.; a division of Activar Construction Products Group.
    - b. Larsen's Manufacturing Company.
  - 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type: UL-rated 5 lbs. nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

### 2.2 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel 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.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated 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 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.

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1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
  1. Mounting Brackets: 54 inches (1372 mm) above finished floor to top of fire extinguisher.
- C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416





## SECTION 122413 - ROLLER WINDOW SHADES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes manually operated roller shades.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.
- C. Samples: For each exposed product and for each color and texture specified.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Draper Inc.
  - 2. Hunter Douglas Contract.
  - 3. Springs Window Fashions; SWFcontract.

## 2.2 ROLLER SHADES

- A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
  - 1. Bead Chains: Manufacturer's standard.
    - a. Loop Length: Full length of roller shade.
    - b. Limit Stops: Provide upper and lower ball stops.
    - c. Chain-Retainer Type: Clip, jamb mount.
- B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
  - 1. Roller Mounting Configuration: Double roller, side by side.
  - 2. Roller Drive-End Location: Right side of inside face of shade.
  - 3. Direction of Shadeband Roll: Regular, from back of roller.
  - 4. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- E. Shadebands:
  - 1. Shadeband Material: Light-filtering fabric.
  - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
    - a. Type: Enclosed in sealed pocket of shadeband material.
    - b. Color and Finish: As selected by Architect from manufacturer's full range.
- F. Installation Accessories:
  - 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
    - a. Shape: L-shaped.
    - b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open, but not less than 4 inches.
  - 2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.

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- a. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open, but not less than 4 inches.
3. Endcap Covers: To cover exposed endcaps.
4. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.
  - a. Closure-Panel Width: As indicated on Drawings.
5. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
6. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
7. Installation Accessories Color and Finish: As selected from manufacturer's full range.

### 2.3 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
  1. Source: Roller-shade manufacturer.
  2. Type: Woven PVC-coated fiberglass and PVC-coated polyester.
  3. Weave: Mesh.
  4. Thickness: .
  5. Weight: .
  6. Roll Width: As indicated on drawings.
  7. Orientation on Shadeband: Up the bolt.
  8. Openness Factor: 5 percent.
  9. Color: As selected by Architect from manufacturer's full range.

### 2.4 ROLLER-SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
  1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or

- minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
2. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible except as follows:
1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than [1:4] <Insert ratio>, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
  2. Skylight Shades: Provide battens and seams at uniform spacings along shadeband as required to ensure shadeband tracking and alignment through its full range of movement without distortion or sag of material.
  3. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

## PART 3 - EXECUTION

### 3.1 ROLLER-SHADE INSTALLATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Install roller shades level, plumb, and aligned with adjacent units, according to manufacturer's written instructions.
  1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.
- D. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- E. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.

END OF SECTION 122413

## SECTION 123623.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad countertops.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For plastic-laminate-clad countertops.
- C. Samples: Plastic laminates in each type, color, pattern, and surface finish required.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For the following:
1. Composite wood products.
  2. High-pressure decorative laminate.
  3. Adhesives.

#### 1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of products.

#### 1.5 FIELD CONDITIONS

- A. Environmental Limitations without Humidity Control: Do not deliver or install wood countertops 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.

## PART 2 - PRODUCTS

### 2.1 FABRICATORS

- A. Fabricators: Subject to compliance with requirements, available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Horizon Group, Inc.
  2. Marcon Industries, Inc.
  3. Robertson Manufacturing, Inc.
  4. Red Bud Ridge Manufacturing, Inc.

### 2.2 PLASTIC-LAMINATE-CLAD COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Formica Corporation.
    - b. Laminart LLC.
    - c. Pionite; a Panolam Industries International, Inc. brand.
    - d. Wilsonart LLC.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. As selected by Architect from manufacturer's full range.
- E. Edge Treatment: Same as laminate cladding on horizontal surfaces.
- F. Core Material: Particleboard or MDF.
- G. Core Material at Sinks: Particleboard made with exterior glue.
- H. Core Thickness: 1-1/8 inch.
- I. Paper Backing: Provide paper backing on underside of countertop substrate.

## 2.3 MISCELLANEOUS MATERIALS

- A. Adhesive for Bonding Plastic Laminate: As selected by fabricator to comply with requirements.
  - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.
- B. Installation Adhesive:

## 2.4 FABRICATION

- A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:
- B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
  - 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. 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.
  - 2. Seal edges of cutouts by saturating with varnish.
- C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
  - 1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten in accordance with manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

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- E. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
  - 1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
  - 2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
  - 3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.
  
- F. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 123623.13



SECTION 312000 - EARTH MOVING

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. Excavating and backfilling for buildings and structures.
  - 2. Drainage course for concrete slabs-on-grade.

1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
  - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
- C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- D. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
  - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
  - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- F. Fill: Soil materials used to raise existing grades.
- G. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and

pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.
  2. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.
- H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D1586.
- I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

#### 1.4 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
1. Do not proceed with work on adjoining property until directed by Architect.
- C. Utility Locator Service: Notify "One Call" for area where Project is located before beginning earth-moving operations.
- D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 015000 "Temporary Facilities and Controls" are in place.

- E. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.
- F. The following practices are prohibited within protection zones:
  - 1. Storage of construction materials, debris, or excavated material.
  - 2. Parking vehicles or equipment.
  - 3. Foot traffic.
  - 4. Erection of sheds or structures.
  - 5. Impoundment of water.
  - 6. Excavation or other digging unless otherwise indicated.
  - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- G. Do not direct vehicle or equipment exhaust towards protection zones.
- H. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D2487 , or a combination of these groups; free of rock or gravel larger than **3 inches** in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
  - 1. Plasticity Index: **<Insert value>**.
- C. Unsatisfactory Soils: Soil Classification [**Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487**] , or a combination of these groups.
  - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.

- G. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.
- H. Sand: ASTM C33/C33M; fine aggregate.
- I. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

## 2.2 CONTROLLED LOW-STRENGTH MATERIAL

- A. Controlled Low-Strength Material: Self-compacting, flowable concrete material produced from the following:
  - 1. Portland Cement: ASTM C150/C150M, Type II .
  - 2. Fly Ash: ASTM C618, Class C or F.
  - 3. Normal-Weight Aggregate: ASTM C33/C33M, 3/4-inch nominal maximum aggregate size.
  - 4. Foaming Agent: ASTM C869/C869M.
  - 5. Water: ASTM C94/C94M.
  - 6. Air-Entraining Admixture: ASTM C260/C260M.
- B. Produce low-density, controlled low-strength material with the following physical properties:
  - 1. As-Cast Unit Weight: 36 to 42 lb/cu. ft. at point of placement, when tested according to ASTM C138/C138M.
  - 2. Compressive Strength: 80 psi , when tested according to ASTM C495/C495M.
- C. Produce conventional-weight, controlled low-strength material with 80-psi compressive strength when tested according to ASTM C495/C495M.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

### 3.2 DEWATERING

- A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

- B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
- D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

### 3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

### 3.4 EXCAVATION, GENERAL

- A. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.
  - 1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; and soil, boulders, and other materials not classified as rock or unauthorized excavation.
    - a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
  - 2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
    - a. 24 inches outside of concrete forms other than at footings.
    - b. 12 inches outside of concrete forms at footings.
    - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
    - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
    - e. 12 inches beneath bottom of concrete slabs-on-grade.
    - f. 6 inches beneath pipe in trenches and the greater of 24 inches wider than pipe or 42 inches wide.

### 3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

### 3.6 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
  1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

### 3.7 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.8 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
  2. Surveying locations of underground utilities for Record Documents.
  3. Testing and inspecting underground utilities.
  4. Removing concrete formwork.
  5. Removing trash and debris.
  6. Removing temporary shoring, bracing, and sheeting.
  7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

### 3.9 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill voids with satisfactory soil while removing shoring and bracing.
- D. Initial Backfill:

1. Soil Backfill: Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
  - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

E. Final Backfill:

1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

3.10 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  1. Under grass and planted areas, use satisfactory soil material.
  2. Under walks and pavements, use satisfactory soil material.
  3. Under steps and ramps, use engineered fill.
  4. Under building slabs, use engineered fill.
  5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.11 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698 :

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

### 3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  1. Provide a smooth transition between adjacent existing grades and new grades.
  2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
  1. Turf or Unpaved Areas: Plus or minus 1 inch .
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

### 3.14 SUBSURFACE DRAINAGE

- A. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
  1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D698 with a minimum of two passes of a plate-type vibratory compactor.
  2. Place and compact impervious fill over drainage backfill in 6-inch- thick compacted layers to final subgrade.

### 3.15 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
  1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.



2. Place drainage course 6 inches or less in compacted thickness in a single layer.
3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D698.

### 3.16 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
  1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### 3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
  1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

**SECTION 220050**  
**BASIC PLUMBING REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Basic Plumbing Requirements specifically applicable to Mechanical Division Specification Sections.
- B. Division 22 Specification requirements also include, by reference, all Division 00 and 01 specification sections. This contractor is responsible to review these specification sections. Requirements of these specification sections are included as a part of this contract.

**1.02 OWNER OCCUPANCY**

- A. The owner will occupy the premises during the construction period.
- B. Limit use of site and premises to allow owner occupancy.
- C. Cooperate with the owner to minimize conflict and to facilitate owner's operations.
- D. Schedule the work to accommodate this requirement.

**1.03 REGULATORY REQUIREMENTS**

- A. This contractor shall give proper authorities all requisite notices relating to work in their charge, obtain official permits, licenses for temporary construction and pay proper fees for it.
- B. This contractor is to be solely answerable for and shall promptly make good all damage, injury or delay to other contractors, to neighboring premises or to persons or property of the public by themselves, by their employees or through any operation under their charge, whether in the contract or extra work.
- C. No attempt has been made to reproduce in these specifications any of the rules or regulations contained in city, state or federal ordinances and codes pertaining to the work covered by these specifications that the contractor be thoroughly familiar with all such ordinances and codes.
- D. The fact that said various rules, regulations and ordinances are not repeated in this specification does not relieve the contractor of the responsibility of making the entire installation in accordance with the requirement of those authorities having jurisdiction.
- E. All work shall comply with the applicable recommendations of:
  - 1. The National Board of Fire Underwriters
  - 2. The American Gas Association
  - 3. The National Fire Protection Association (NFPA)
  - 4. The Occupations Safety and Health Act (OSHA)
  - 5. Current IBC Building Code
  - 6. Current applicable city building codes
- F. Mechanical: Conform to current mechanical code.
- G. Plumbing: Conform to current plumbing code.
- H. Obtain permits and request inspections from authority having jurisdiction.
- I. Safe Drinking Water Act and Senate Bill S.3874: All products must meet the lead-free requirements of the SDWA and NSF/ANSI 372 certification.

**1.04 PROJECT/SITE CONDITIONS**

- A. Install work in locations shown on the drawings unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of owner and architect/engineer before proceeding.
- C. This contractor, before submitting their bid, shall visit the site of the project to familiarize themselves with locations and conditions affecting their work.

- D. It is the intent of this specification that the contractor furnishes all labor and material required completing the installation as outlined in the drawings and specifications. No additions to the contract price shall be allowed due to the failure of this contractor to properly evaluate the effect of existing conditions on the work to be done under this contract.
- E. Whenever renovation or remodeling or relocation of existing equipment is included in the contract, it is imperative that all locations of existing piping, ductwork, equipment, services and grades be noted on the job site before bid is submitted and that all elevations and grades be verified before roughing in new work.
- F. This contractor shall provide holes as necessary for the installation of their work and in accordance with other specification sections in materials other than the structure.

#### **1.05 SEQUENCING AND SCHEDULING**

- A. This contractor shall arrange their work in order that it progresses along with the general construction of the building.
- B. This contractor shall be kept informed as to the work of other trades engaged in the project and shall execute their work in such a manner so as not to delay or interfere with progress of other contractors.
- C. Where space for mechanical and electrical lines and piping is limited, it is imperative that all such trades coordinate their work so as to ensure concealment in space provided. Where conflict exists, the engineer shall decide priority of space. If work is not properly coordinated, the engineer may require removal and relocation of work without additional compensation.

#### **1.06 GUARANTEE**

- A. This contractor shall guarantee all of the apparatus, materials, equipment furnished and labor installed under this contract for a period of one year after date of final acceptance, unless a longer period is specified.
- B. Neither final certificate of payment nor any provisions in the contract documents nor partial or complete occupancy of premises by owner shall constitute an acceptance for work not done in accordance with contract documents or relieve the contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.
- C. Should any defects arise as the result of defective workmanship or material within the guarantee period set forth, this contractor shall make the necessary correction at their own expense.

#### **1.07 ENGINEER APPROVED EQUAL PRODUCTS**

- A. When the engineer, at the request of the interested parties, including the contractor, supplier and manufacturer approved "engineer approved equal" products for this project, such products are approved on the assumption that they will equal or exceed the performance of the products specified.
- B. If such products do not do so after being installed on this project, this contractor shall replace or modify the particular product as necessary to equal the performance of the products specified at no expense to the owner, architect or engineer.
- C. Request for "engineer approved equal" products shall be received by the architect/engineer prior to the last addendum being issued. Requests for substitutions received after this date will not be considered. Substitution requests shall clearly state which products are being considered for substitution. Substitution requests shall include all pertinent product information needed to evaluate the substitution as an "equal".
- D. Similar products shall be all of the same manufacturers and style. There is no exception to this unless prior approval has been granted from engineer.

**1.08 OWNER'S RIGHT OF SALVAGE**

- A. Before beginning construction, this contractor shall check and verify with the owner each item of existing equipment that must be removed.
- B. The owner will designate which items of material or equipment not reused that they may wish to keep. This contractor shall then remove these items with care and store in a location designated by the owner for the owner's disposal.
- C. All other items of equipment to be removed and not specified for reuse in new construction or reserved by the owner for their use shall become the property of the contractor and shall be removed from site.

**1.09 PROTECTION AND MAINTENANCE**

- A. Where necessary to connect to any existing utility service, this contractor shall contact the owner and shall coordinate any building service connection with the owner so that normal operation to the building is disrupted as little as possible.
- B. Any work to be done in existing structures shall be coordinated with the owner and arrangements made so that traffic flow may be maintained and areas finished where possible before other areas are begun.
- C. This contractor shall protect existing equipment in finished areas from dirt, dust and damage as a result of their work.
- D. Coordinate protection requirements with department heads before beginning construction.
- E. Protect any building openings from unauthorized entry. Coordinate with owner where building entry must be controlled.

**1.10 DEMOLITION**

- A. This contractor shall be responsible for the demolition and removal of all existing mechanical elements within the project area except as follows:
  - 1. Elements shown on the drawings as "existing to remain and/or to be relocated".
  - 2. Elements serving adjacent areas.
  - 3. Elements required for the support of the newly remodeled areas.
  - 4. All elements to be removed are subject to the Owner's Right of Salvage.
- B. Preserve services to the existing facility. Extend/reroute/reconnect existing systems as required providing for the continued function of these systems.

**1.11 CUTTING AND PATCHING**

- A. This contractor shall do all cutting and patching necessary for the installation of their work in all existing and new buildings unless otherwise noted.
- B. This contractor shall arrange for openings in the building as required for the installation of equipment furnished under this contract.
- C. Where sewers must be extended or changed, patching with concrete will be done in the building. Patching shall be at both the top and bottom of sleeves where above grade.
- D. In areas where the integrity of new or existing fire separation assembly/wall is compromised by the work, contractor shall be responsible to patch and/or seal openings as necessary to maintain/return fire separation to rating as required by applicable codes.
- E. This contractor shall do all cutting and patching required for their work beyond the remodeled areas unless otherwise noted. All finish work shall include patching to match existing adjacent surfaces. Painting shall be by others.

**1.12 CLEANING AND RUBBISH**

- A. This contractor shall upon completion of his work, remove all rubbish and debris resulting from their operation and shall remove it from site at their own expense.

- B. In so far as their work is concerned, all equipment shall be cleaned and the premises left in first class condition.
- C. At the end of each working day, this contractor shall remove all of their debris, rubbish, tools and surplus materials from the project work area. The work area shall be broom clean and left in a neat and orderly condition. The contractor for the removal of debris from the project shall not use the owner's waste disposal facility.

#### **1.13 SEALING AND PENETRATION**

- A. Clearance around the piping passing through fire or smoke rated construction shall be sealed to maintain the rated integrity of the construction (1 hr. 2 hrs. etc.). One and two-hour rated assemblies are to be patched on both sides of the assembly.
- B. This contractor shall verify rating and location of all such construction with the architectural drawings and seal all penetrations.
- C. Manufacturer offering products to comply with the requirements include the following:
  - 1. Dow Corning "Silicone RTV Foam"
  - 2. 3-M Corporation "Fire Barrier Caulk and Putty"
  - 3. Thomas & Betts "Flame Safe Fire Stop System"
- D. Installation of these products to be in strict accordance with manufacturer's recommendations and architectural specification sections or equivalent fire stopping architectural specification section.
- E. This contractor shall submit shop drawings showing approved sealing assemblies to be utilized on this project.

#### **1.14 ELECTRICAL CONNECTIONS**

- A. This contractor shall turn over all magnetic starters, thermal protective switches and speed changing switches furnished under this contract for all motor driven equipment to the electrical contractor who will install such starters and switches and wire them to their respective motors as a part of the electrical contract.

#### **1.15 HAZARDOUS MATERIALS**

- A. If the contractor stores any hazardous solvents or other materials on the site, they shall obtain copies of the safety data sheets for the materials and post them on the site. The contractor shall inform the owner and all employed of any potential exposure to this material.
- B. At no time shall any product containing asbestos be incorporated into the work.
  - 1. If asbestos materials are encountered, report to the owner. The owner will be responsible for asbestos removal.

#### **1.16 RECORD DRAWINGS**

- A. This contractor shall provide, at the conclusion of the project, one clean, non-torn, neat, and legible "as-built" set of drawings to the owner. These drawings shall show the routing of pipes, ductwork and equipment drawn in at scaled locations. All dimensions indicated shall be referenced to a column line. A set of construction blue prints will be furnished for this work.
- B. All mechanical systems installed shall be shown on the "as-built" drawings.
- C. Refer to respective architectural specification section for additional information.
- D. This contractor shall update these drawings during the project at least every week.

#### **1.17 REVIEW OF MATERIALS**

- A. This contractor shall submit to the engineer for review one (1) electronic copy of a brochure giving a complete list of materials and equipment they propose to furnish. The brochure shall contain complete information as to the make of equipment, type, size, capacities, dimensions and illustration. One of the returned copies shall be kept on the job at all times.

- B. Checking of submittal drawings by the engineer does not relieve the contractor of the responsibility for the accuracy of such drawings and for their conformity to drawings and specifications unless the contractor notifies engineer in writing of such deviation at time such drawings are furnished.
- C. All submittals shall have the date marked on them when the contractor receives them from the supplier. Submittals shall be submitted through the contractor and shall not come direct from the supplier to the architect or engineer.
- D. This contractor shall mark the date and sign each set that they have checked each of them in their entirety before submitting to the engineer. Submittals that are not dated and signed by the contractor will not be accepted, or checked and will be marked "resubmit" and sent back to the contractor.

#### **1.18 SCOPE OF WORK**

- A. All work shall be performed by well-qualified and licensed mechanics with a thorough knowledge of the various systems involved in this building. It shall be this contractor's responsibility to see that their mechanics are familiar with all the various codes and tests applicable to this work.
- B. All equipment shall be new and of the type as specified by the engineer unless otherwise noted in these specifications or on the drawings to remain and or be reused.
- C. The intent of the drawings and specifications is for complete installation of the systems outlined in the drawings and specifications so that at the conclusion of construction the system will be turned over to the owner complete and ready for safe and efficient operation.
- D. This contractor shall be required to furnish and install all such items normally included on systems of this type, which, while not mentioned directly herein or on the drawings are obviously essential to the installation and operation of the system and which are normally furnished on quality installation of this type. The drawings and specifications cannot deal individually with the many minute items that may be required by the nature of the systems.
- E. If there is a discrepancy between the drawings and the specifications or within either document, the more stringent requirement shall be estimated unless brought to the engineer's attention and an addendum is issued for clarification.
- F. The Plumbing Contractor shall establish system elevations prior to fabrication and installation. The Plumbing Contractor shall coordinate elevations with other trades. All elevations shall be coordinated with all trades in the field prior to installation. When a conflict between trades arises, the design team shall be notified immediately prior to further installation however priority shall be as follows:
  - 1. Lighting Fixtures
  - 2. Gravity flow piping, including condensate.
  - 3. Sheet metal.
  - 4. Cable trays, including access space.
  - 5. Other piping.
  - 6. Conduits and wireway.

#### **1.19 VERIFICATION OF ELEVATION OF EXISTING LINES**

- A. This contractor, before starting any new work, shall verify the elevations of all existing piping to which they must connect under this contract. The contractor shall report any discrepancies between drawing elevations and actual elevations to the engineer before proceeding with the work. Failure of the contractor to do so shall make them liable for the cost of extra work involved.

#### **1.20 CLEANING OF MECHANICAL SYSTEMS**

- A. The mechanical contractor shall clean and passivate all plumbing systems. Flush systems with water until free from all sand, grit, gravel, oil, etc. Provide Babcock/Wilcox Millipore and biological testing on the flush water. The flush will be considered a success when the water

exiting the system contains less than 100 ppb of total suspended solids and less than 100 RLUs.

- B. Where connections are made to existing piping systems, this contractor shall provide isolation valves, threaded tees, etc., as required to facilitate the cleaning and testing of all new piping.
- C. This contractor shall thoroughly clean all rust, grease, plaster, cement, etc., from all equipment and piping furnished and installed by them as required to leave surfaces suitable for finish painting.
- D. This contractor shall keep all pipes, traps, waste lines, ducts, etc., plugged, drained or otherwise protected during construction. All items of mechanical equipment shall be suitably protected and upon completion of project shall be equal to new condition.

**1.21 TRENCHING AND BACKFILLING**

- A. Each contractor is responsible for their own individual trenching and backfilling unless otherwise noted in the drawings or addendum.
- B. All underground utilities, piping, etc shall be located exactly before digging. This contractor shall be held responsible for all damages caused by failure to do so.
- C. Any backfill shall be tamped and compacted to prevent future settling. The backfill shall be installed to a smooth and level grade and installed in accordance with local codes.
- D. All excess dirt shall be cleared from the area and disposed of as directed by the owner.
- E. Refer to architectural specification sections for additional requirements.

**1.22 ALTERNATES**

- A. Refer to General Specification Sections for alternate bid description.

**1.23 DIGITAL MEDIA AGREEMENT**

- A. Computer Aided Drafting (CAD) documents may be available to the contractor for some uses. Contact the engineer prior to bidding to determine what information is available to be transmitted to the contractor in digital form.
- B. When documents are determined to be available, and as requested by the contractor, they will be transmitted upon the completion and execution of the MODUS digital media agreement.

**PART 2 PRODUCTS**

**NOT USED**

**PART 3 EXECUTION**

**NOT USED**

**END OF SECTION 220050**

**SECTION 220529**

**HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pipe hangers and supports
- B. Accessories
- C. Flashing

**1.02 RELATED SECTIONS**

- A. Specification Section 221116 - Domestic Water Piping

**1.03 REFERENCES**

- A. ASTM F708 - Design and Installation of Rigid Pipe Hangers
- B. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer
- C. MSS SP69 - Pipe Hangers and Supports - Selection and Application
- D. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices

**1.04 SUBMITTALS**

- A. Product Data: Provide manufacturers catalog data including load capacity.
- B. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- C. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

**1.05 REGULATORY REQUIREMENTS**

- A. Conform to applicable code for support of piping.

**PART 2 PRODUCTS**

**2.01 PIPE HANGERS AND SUPPORTS**

- A. Manufacturers:
  - 1. Anvil International
  - 2. Tolco/Cooper B-Line
  - 3. Engineer approved equal.
- B. Plumbing Piping - Drain, Waste and Vent:
  - 1. Conform to ASME B31.9; ASTM F708
  - 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inch: Carbon steel adjustable swivel, split ring.
  - 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  - 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  - 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron bracket.
  - 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
  - 7. Vertical Support: Steel riser clamp.
  - 8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  - 9. Copper Pipe Support: Carbon steel ring, adjustable, and copper plated.
  - 10. Provide zinc coated hangers and supports for all non air conditioned areas.
- C. Plumbing Piping - Water:
  - 1. Conform to ASME B31.9; ASTM F708.
  - 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel adjustable swivel, split ring. Anvil International Figure 104.



3. Hangers for Hot Pipe Sizes 6 Inch and Over: Adjustable steel yoke, cast iron roll, single hanger.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron bracket.
6. Wall Support for Pipe Sizes 4 Inches Over: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
10. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
11. Provide zinc coated hangers and supports for all non air conditioned areas.

## **2.02 ACCESSORIES**

- A. Hanger Rods: Mild steel threaded both ends, threaded one end or continuous threaded.

## **2.03 FLASHING**

- A. Metal Flashing: 26 gauge galvanized steel.
- B. Metal Counter Flashing: 22 gauge galvanized steel.
- C. Flexible Flashing: 47 mil thick sheet butyl compatible with roofing.
- D. Caps: Steel, 22 gauge minimum; 16 gauge at fire resistant elements.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.

### **3.02 PIPE HANGERS AND SUPPORTS**

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- C. Place hangers within 12 inch of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub with 5 foot maximum spacing between hangers.
- F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Provide copper plated hangers and supports for copper piping.
- J. Design hangers for pipe movement without disengagement of supported pipe.
- K. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

### **3.03 FLASHING**

- A. Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting three inch (3") minimum above finished roof surface with 24" x 24" sheet size. Turn flanges back into wall and caulk, metal counterflash, and seal for pipes through outside walls. Refer to architectural drawings and specifications for additional information.

- C. Seal floor, shower, and mop sink drains watertight to adjacent materials.
- D. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

**3.04 SCHEDULES**

<b>HANGER ROD PIPE SIZE</b>	<b>MAX. HANGER SPACING FEET</b>	<b>DIAMETER INCHES</b>
1/2 to 1-1/4	6.5	3/8
1-1/2 to 2	10.0	3/8
2-1/2 to 3	10.0	1/2
C.I. Bell & Spigot (or No-Hub) and at Joints	5.0	5/8

**END OF SECTION 220529**



**SECTION 220553**  
**IDENTIFICATION FOR PLUMBING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nameplates
- B. Tags
- C. Labels
- D. Schedule

**1.02 REFERENCES**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems

**1.03 SUBMITTALS**

- A. Submit list of wording, symbols, letter size, and color-coding for mechanical identification.
- B. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Manufacturer's Instructions: Indicate installation instructions, special procedures, and installation.
- E. Project Record Documents: Record actual locations of tagged valves, include valve tag numbers.

**PART 2 PRODUCTS**

**2.01 NAMEPLATES**

- A. Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

**2.02 TAGS**

- A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- B. Information Tags: Clear plastic with printed "Danger," "Caution" or "Warning" and message; size 3-1/4" x 5-5/8" with grommet and self-locking nylon ties.
- C. Tag Chart: Typewritten letter size list in anodized aluminum frame plastic laminated.

**2.03 LABELS**

- A. Description: Laminated Mylar, size 1.9" x 0.75" adhesive backed with printed identification.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. De-grease and clean surfaces to receive adhesive for identification materials.

**3.02 INSTALLATION**

- A. Install identifying devices after completion of coverings and painting.
- B. Install plastic nameplates with corrosive-resistant mechanical fasteners or adhesive.
- C. Install labels with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer. Apply paint primer before applying labels for unfinished canvas covering.
- D. Install tags using corrosion resistant chain. Number tags consecutively by location.
- E. Tag automatic controls, instruments, and relays. Key to control schematic.

- F. Identify piping, concealed or exposed as indicated in schedule below. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 foot on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure and at each obstruction. Identify on both sides of any wall.
- G. Conform to owner's existing identification scheme. Verify with owner prior to bid.

**3.03 IDENTIFICATION SCHEDULE**

<b>COMPONENT</b>	<b>IDENTIFICATION</b>
Plumbing Equipment (softener, Water Heater, etc.)	Plastic Nameplates
Pumps (Below 1 HP)	Tags
All Valves	Tags
Control Panels and Other Major Control Components	Plastic Nameplates
Automatic Controls, Instruments, Relays	Tags
Piping (Larger than 3/4")	Plastic Tape Pipe Markers
Piping (3/4" and Smaller)	Plastic Tape Pipe Markers

**END OF SECTION 220553**

**SECTION 220719  
DOMESTIC PLUMBING INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fiberglass

**1.02 RELATED SECTIONS**

- A. Specification Section 220553 - Identification for Plumbing Piping and Equipment

**1.03 REFERENCES**

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus
- B. ASTM C518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- C. ASTM C547 - Standard Specification for Mineral Fiber Preformed Pipe Insulation
- D. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- F. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
- G. NAIMA National Insulation Standards
- H. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials
- I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials

**1.04 SUBMITTALS**

- A. Product Data: Provide product description, thermal characteristics, list of materials, and thickness for each service and location.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

**1.06 REGULATORY REQUIREMENTS**

- A. Conform to maximum flame spread/smoke developed rating of 25/50 in accordance with ASTM E84.

**1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Accept materials on site, labeled with manufacturer's identification, product density and thickness.

**1.08 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

**PART 2 PRODUCTS**

**2.01 FIBERGLASS**

- A. Manufacturers:
  - 1. Johns Manville Micro-Lok HP
  - 2. Owens Corning
  - 3. Knauff

4. Engineer approved equal.
- B. Insulation: ASTM C547 rigid molded, noncombustible.
- C. "K" Value: ASTM C335, 0.23 at 75 deg F.
- D. Minimum Service Temperature: 0 deg F.
- E. Maximum Service Temperature: 800 deg F.
- F. Maximum Moisture Absorption: <5% by weight.
- G. Vapor Barrier Jacket: ASTM C1136, white Kraft paper with fiberglass yarn, bonded to aluminized film.
- H. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
- I. Secure with self-sealing longitudinal laps and butt strips.
- J. Surface Burning: ASTM E84; Flame Spread-25, Smoke Developed-50
- K. VOC Content: ASTM D5116; 0.15 g/l

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry with foreign material removed.

#### **3.02 INSTALLATION**

- A. Install materials in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Insulated Dual Temperature Pipes or Cold Pipes Conveying Fluids Below Ambient Temperature:
  1. Provide vapor barrier jackets, factory applied or field applied.
  2. Insulate fittings, joints and valves with molded insulation of like material and thickness as adjacent pipe.
  3. Provide PVC fitting covers.
  4. Continue insulation through walls (unless in firewall sleeves), pipe hangers and other pipe penetrations.
  5. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
  6. Vapor seal insulation ends every 20 feet.
- D. Insulated Pipes Conveying Fluids Above Ambient Temperature:
  1. Provide standard jackets with vapor barrier, factory applied.
  2. Insulate fittings, joints and valves with insulation of like material and thickness as adjoining pipe.
  3. Provide PVC fitting covers.
  4. Continue insulation through walls (unless in firewall sleeves) pipe hangers and other pipe penetrations.
- E. Inserts and Shields:
  1. Manufacturers:
    - a. Jeff Company/Buckaroo
    - b. Amacell
    - c. Cooper/Eaton
    - d. TPS
    - e. Engineer approved equal.
  2. Shields: Galvanized saddle with flared edges between pipe hangers or pipe hanger rolls and inserts.

3. Insert Location: Between support shield and piping and under the vapor barrier and finish jacket.
  4. Insert Configuration: Minimum six inch (6") long of same thickness and contour as adjoining insulation; may be factory fabricated.
  5. Insert Type:
    - a. Polystyrene and Fiberglass Insulation: 360 degree polyisocyanurate or phenolic foam cylindrical insert capable of supporting piping system. Pre-fabricated, insulated and jacketed supports are acceptable. Blocks, plugs, or wood material are not acceptable.
    - b. Flexible Elastomeric Foam Insulation: Pre-fabricated 360 degree insulated pipe hanger with polyethylene inserts (Armacell "Armafix" or equal). Match thickness of pipe insulation. Hanger shall have PVC or aluminum jacket. Provide friction tape on inside of pipe clamp/support to avoid slipping.
- F. Insulation shall be continuous at all hangers. Hanger shall not be in direct contact with pipe.

**3.03 TOLERANCE**

- A. Substituted insulation materials shall provide thermal resistance within 10% at normal conditions, as materials indicate.

**3.04 SCHEDULE**

**FIBERGLASS INSULATION**

<b>PIPING SYSTEMS</b>	<b>PIPE SIZE</b>	<b>THICKNESS</b>
Domestic Hot Water and Re-Circulation	Less than 1.5"	1"
Plumbing Vents within 10' of Exterior	All	1"
Domestic Cold Water	All	1"
Condensate Drain from Cooling Coil	All	1"

**END OF SECTION 220719**





**SECTION 221116**  
**DOMESTIC PLUMBING PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Sanitary sewer piping (below grade)
- B. Sanitary sewer piping (above grade)
- C. Water piping (above grade)
- D. Water piping (press fittings)
- E. Ball valves
- F. Calibrated balance valves
- G. Pipe accessories
- H. Equipment drains and overflows

**1.02 RELATED SECTIONS**

- A. Specification Section 220553 - Identification for Plumbing Piping and Equipment

**1.03 REFERENCES**

- A. ASME B31.1 - Power Piping
- B. ASME B31.9 - Building Service Piping
- C. ASME Section 9 - Welding and Brazing Qualifications
- D. ASME B16.18 - Cast Bronze Solder - Joint Pressure Fittings
- E. ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings
- F. ASME B16.23 - Cast Copper Alloy Solder-Joint Drainage Fittings – DWV
- G. ASME B16.26 - Cast Bronze Fittings for Flared Copper Tubes
- H. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings - DWV
- I. ASME B16.32 - Cast Copper Alloy Solder-Joint Fittings for Solvent Drainage Systems
- J. ASTM A74 - Cast Iron Soil Pipe and Fittings
- K. ASTM B32 - Solder Metal
- L. ASTM B88 - Seamless Copper Water Tube
- M. ASTM B306 - Copper Drainage Tube (DWV)
- N. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings
- O. ASTM D1785 - Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120
- P. AWS A5.8 - Brazing Filler Metal
- Q. AWWA C651 - Disinfecting Water Mains
- R. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems
- S. CISPI 310 - Joints for Hubless Cast Iron Sanitary Systems
- T. NSF/ANSI 61 - Drinking Water System Components - Health Effects
- U. NSF/ANSI 372 - Drinking Water System Components - Lead Content

**1.04 SUBMITTALS**

- A. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

- B. Provide schedule of all system types and piping and fitting types provided, clearly indicating which submitted piping and fittings are associated to each system on the project. Schedule shall be at the beginning of piping submittal

#### **1.05 PROJECT RECORD DOCUMENTS**

- A. Record actual locations of valves.

#### **1.06 OPERATION AND MAINTENANCE DATA**

- A. Maintenance Data: Include installation instructions, spare parts list and exploded assembly views.

#### **1.07 QUALITY ASSURANCE**

- A. Perform work in accordance with the State of Iowa.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.
- D. Welder's Certification: In accordance with ASME Section IX.
- E. Identify pipe with marking including size, material classification, specification, potable water certification and water pressure rating.
- F. Maintain one copy of each document on site.
- G. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute or be prior approved by engineer.
- H. All cast iron soil pipe and fittings shall be installed according to the latest edition of the Cast Iron Soil Pipe and Fittings Handbook.

#### **1.08 REGULATORY REQUIREMENTS**

- A. Perform work in accordance with local jurisdiction plumbing code.
- B. Wetted surfaces of brass and bronze components shall contain <0.25% weighted average lead content (lead free) as defined by NSF/ANSI Standards 61 and 372.

#### **1.09 DELIVERY, STORAGE AND PROTECTION**

- A. Deliver, store, protect and handle products to site.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work and isolating parts of completed system.

#### **1.10 WARRANTY**

- A. Provide a 25-year non-prorated warranty on PEX tubing.

#### **1.11 ENVIRONMENTAL REQUIREMENTS**

- A. Do not install underground piping when bedding is wet or frozen.

### **PART 2 PRODUCTS**

#### **2.01 SANITARY SEWER PIPING (BELOW GRADE)**

- A. PVC Pipe: Schedule 40
  1. ASTM D2665.
  2. Fittings: PVC.
  3. Joints: ASTM D2855 solvent weld with ASTM D2564 solvent cement.

## **2.02 SANITARY SEWER PIPING (ABOVE GRADE)**

- A. Cast Iron Pipe:
  - 1. CISPI 301 hubless service weight three inch (3") and larger.
  - 2. Fittings: Cast iron.
  - 3. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies conforming to CISPI 310.
  - 4. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute or be prior approved by engineer.
- B. Copper Tube:
  - 1. ASTM B306, type #M.
  - 2. Fittings: ASME B16.29 wrought copper.
  - 3. Joints: ASTM B32 solder Grade 50B.

## **2.03 WATER PIPING (ABOVE GRADE)**

- A. Copper Tubing:
  - 1. ASTM B88, type #L hard drawn.
  - 2. Fittings: ASME B16.22, wrought copper and bronze.
  - 3. Joints: ASTM B32, solder, Grade 95TA.
- B. Cross-Linked Polyethylene (PEX) (2" AND SMALLER) (STICKS OF PEX)
  - 1. ASTM F876, SDR 9 polyethylene PEX-a or PEX-b tubing
    - a. Rated for continuous operation by the Plastic Pipe Institute (PPI) at the following conditions: 160 psi @ 73.4 deg F, 100 psi @ 180 deg F, 80 psi @ 200 deg F.
    - b. Minimum bend radius for cold bending of the pipe shall not be greater than 6 times the outside diameter of the pipe. Provide bend supports supplied by the tubing manufacturer for all bends with a radius tighter than this requirement.
    - c. Plenum Rating: Pipe shall not exceed a maximum flame spread/smoke emission rating of 25/50 in compliance ASTM E84. Provide metal shields clipped to bottom side of piping or fully insulate piping as necessary to meet this requirement.
    - d. Fittings: ASTM F2080 or ASTM F1960 cold-expansion, compression sleeve fittings. Provide specific fitting types as required to maintain warranty of piping manufacturer.
  - 2. Manufacturer shall provide components of the PEX tubing system including all plastic piping, fittings, manifolds, supports, and any other ancillary items required for a complete installation.
  - 3. Warranty: Plastic piping shall carry a 25-year non-prorated warranty against failure due to defect in material and workmanship. Manifolds, headers, thermostats, actuators, and other ancillary components shall be warranted for 12 months from date of substantial completion.

## **2.04 WATER PIPING (PRESS FITTINGS)**

- A. Manufacturers:
  - 1. Viega (Propress)
  - 2. Nibco
  - 3. Engineer approved equal.
- B. Material:
  - 1. Tubing Standard:
    - a. Copper tubing shall conform to ASTM B75 or ASTM B88.
  - 2. Press Fitting:
    - a. Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22 and performance criteria of IAPMO PS 117 or ASME B16.51. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed and of the same manufacturer.

## **2.05 BALL VALVES (UP TO AND INCLUDING 2 INCHES)**

- A. Manufacturers:
  - 1. Apollo #77CLF-140/240
  - 2. Watts #LFB 6080/6081 G2-SS
  - 3. Nibco #S/T-585-66-LF
  - 4. Milwaukee #UPBA-400S/450S
  - 5. Engineer approved equal.
- B. Bronze two piece full port body, stainless steel ball and stem, RPTFE seats and thrust washer, lever handle, solder or threaded ends.

## **2.06 CALIBRATED BALANCE VALVES**

- A. Manufacturers:
  - 1. B & G Circuit Setter Plus
  - 2. Taco
  - 3. Watts
  - 4. Victaulic
  - 5. Engineer approved equal.
- B. Construction:
  - 1. Up to 3 Inches: Lead free brass.
  - 2. Temperature and pressure test plug on inlet and outlet.
  - 3. Memory stop.

## **2.07 PIPE ACCESSORIES**

- A. Fittings:
  - 1. All fittings shall be of the same material as the pipe. Material joining the fitting to the pipe shall be free from cracks and shall adhere tightly to each joining surface.
  - 2. All fittings shall be capped with a plug of the same material as the pipe, and gasketed with the same gasket material as the pipe joint or be of material approved by the engineer. The plug shall be able to withstand all test pressures involved without leakage.

## **2.08 EQUIPMENT DRAINS AND OVERFLOWS**

- A. Copper Tubing: ASTM B88, type #M, hard drawn.
  - 1. Fittings: ASME B16.18 cast brass.
  - 2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony or tin and silver with melting range 430 deg F to 535 deg F.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to conserve building space and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.

- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors.
- I. Where pipe support members are welded to structural building frame, scrape, brush clean and apply one coat of zinc rich primer to welding.
- J. Prepare exposed, unfinished pipe, fittings, supports and accessories not pre-finished, ready for finish painting.
- K. Install bell and spigot pipe with bell end upstream.
- L. Install valves with stems upright or horizontal, not inverted.
- M. Install water piping to ASME B31.9.
- N. Clean out all sanitary sewers to remove any debris prior to substantial completion.
- O. All cast iron soil pipe shall be installed in accordance with cast iron soil pipe institute handbook (latest edition).
- P. All cast iron soil pipe shall be marked with the trademark of the soil pipe institute.

### **3.03 PRESS FITTING INSTALLATION**

- A. The installing contractor shall examine the copper tubing and fittings for defects, sand holes or cracks. There shall be no defects of the tubing or fittings. Any damaged tubing or fittings shall be rejected.
- B. The installing contractor shall ensure that sealing elements are properly in place and free from damage. For sizes 2-1/2" to 4", installer should ensure that the stainless steel grip ring is in place.
- C. Copper tubing shall be cut with a wheeled tubing cutter or approved copper tubing cutting tool. The tubing shall be cut square to permit proper joining with the fittings.
- D. Remove scale, slag, dirt, and debris from inside and outside of tubing and fittings before assembly. The tubing end shall be wiped clean and dry. The burrs on the tubing shall be reamed with a deburring or reaming tool.
- E. Press connections: Copper and copper alloy press connections shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fittings. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tools approved by the manufacturer.

### **3.04 APPLICATION**

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

### **3.05 ERECTION TOLERANCES**

- A. Establish invert elevations, slopes for drainage to 1/8 inch per foot 1% minimum. Maintain gradients.
- B. Slope water piping minimum 0.25% and arrange to drain at low points.

### **3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM**

- A. The plumbing contractor is responsible for providing disinfection of domestic water piping system as outlined in this section.
- B. Prior to starting work, verify system is complete, flush and clean.
- C. The plumbing contractor is to make sure sanitary sewer lines are running smooth by running a snake through the sanitary sewer lines prior turning the facility over to the owner.

- D. Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- E. Inject disinfectant, free chlorine in liquid, powder or tablet form throughout system to obtain 50-to 80 mg/L residual.
- F. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15% of outlets.
- G. Maintain disinfectant in system for 24 hours.
- H. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- I. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- J. Take samples no sooner than 24 hours after flushing from 10% of outlets and from water entry and analyze in accordance with AWWA C651. Submit written report to owner.

### **3.07 TESTING**

- A. This contractor shall, before concealing, test all systems installed under this contract as called for in these specifications and as required by local codes. Tests shall be made in the presence of the engineer, local authorities or their duly authorized representative. Any defects discovered in testing shall be corrected and the tests repeated until all defects are eliminated.
- B. This contractor shall be held responsible for all damage resulting from defects in the system.
- C. Domestic Water Testing:
  - 1. At conclusion of construction (before any covering up, painting, or finishing) each portion of the piping or of the entire hot and cold water supply system, it shall be initially tested to be proved tight under 50 psi air pressure. All piping shall withstand test pressures without leaking for a period of time not less than 15 minutes.
  - 2. The system shall not be filled with water until immediately prior to disinfection. A hydrostatic test to a water pressure of 1.5x working pressure up to a maximum of 150 psi shall be performed. All piping shall withstand test pressures without leaking for a period of time not less than 4 hours.
- D. Sanitary and Storm Testing:
  - 1. A hydrostatic test to a water pressure of 10 feet shall be performed. All piping shall withstand test pressures without leaking for a period of time not less than 4 hours.
- E. No covering or backfilling of sewer lines shall be done until inspected by the architect or local inspector. Test T's shall be provided on all waste and vent stacks 4'-6" above each floor as required for testing the plumbing system.
- F. After completion of installation, the systems shall be given tests under full operating conditions and pressures and all adjustments shall be made to make the system operative as required. All safety devices shall be tested for correct operation.

**END OF SECTION 221116**

**SECTION 221119  
DOMESTIC PLUMBING SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Floor drain
- B. Clean out
- C. Trap Primers

**1.02 RELATED SECTIONS**

- A. Specification Section 221116 - Domestic Plumbing Piping
- B. Specification Section 223000 - Plumbing Equipment
- C. Specification Section 224000 - Plumbing Fixtures

**1.03 REFERENCES**

- A. ASME A113.6.3; Floor and Trench Drains
- B. ASME A113.6.4 - Roof, Deck and Balcony Drains
- C. PDI WH-201 - Water Hammer Arrestors
- D. NSF/ANSI 61 - Drinking Water System Components - Health Effects
- E. NSF/ANSI 372 - Drinking Water System Components - Lead Content

**1.04 SUBMITTALS**

- A. Product Data: Provide component sizes, rough-in requirements, service sizes and finishes.
- B. Shop Drawings: Indicate dimensions, weights and placement of openings and holes.
- C. Manufacturer's Instructions: Indicate assembly and support requirements.
- D. Project Record Documents: Record actual locations of equipment, clean out, backflow preventers, water hammer arrestors.
- E. Operation Data: Indicate frequency of treatment required for interceptors.
- F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

**1.05 QUALITY ASSURANCE**

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

**1.06 DELIVERY, STORAGE AND PROTECTION**

- A. Accept specialties on site in original factory packaging. Inspect for damage.

**1.07 REGULATORY REQUIREMENTS**

- A. Wetted surfaces of brass and bronze components shall contain <0.25% weighted average lead content (lead free) as defined by NSF/ANSI Standards 61 and 372.

**PART 2 PRODUCTS**

**2.01 FLOOR DRAIN (FD-1)**

- A. Manufacturers:
  - 1. Watts #FD-100
  - 2. Smith
  - 3. Zurn
  - 4. Josam
  - 5. Wade
  - 6. Sun Drainage
  - 7. Engineer approved equal.



- B. Assembly: ASME A112.6.3.
- C. Epoxy coated cast iron floor drain with anchor flange, reversible clamping collar with primary and secondary weepholes and adjustable strainer.
- D. Accessories:
  - 1. Provide with membrane clamp on all floor drains installed above slab ongrade.
  - 2. Provide with strainer extension to accommodate thick fills as required.
- E. Strainer: Seven inch (7") diameter nickel bronze strainer.
- F. Contractor shall select outlet type.
- G. Outlet size: As noted on drawings.

## **2.02 CLEAN OUT**

- A. Manufacturers:
  - 1. Watts
  - 2. Smith
  - 3. Josam
  - 4. Wade
  - 5. Sun Drainage
  - 6. Engineer approved equal.
- B. Interior Finished Sub or On Grade Floors:
  - 1. Watts #CO-200-R
  - 2. Lacquered cast iron bodies with integral anchor flange, neoprene "O" ring secondary test seal and adjustable combined access cover and plug with gasket seal. Nickel-bronze scoriated cover in service area and round with depressed cover to accept floor finish in finished floor areas.
- C. Interior Finished Wall Areas:
  - 1. Watts #CO-380-RD
  - 2. Line type with lacquered cast iron body and round epoxy coated gasket cover and round stainless steel access cover secured with machine screw.
- D. Cleanout size shall be equal to pipe size up to 4 inches.

## **2.03 ELECTRONIC TRAP PRIMER**

- A. Manufacturers:
  - 1. Sioux Chief 695-E
  - 2. Engineer approved equal.
- B. ASSE 1044 listed and certified, solenoid actuation, vacuum breaker, and distribution manifold. Field adjustable quantity and frequency of water release. Equipped with ASSE 1010 certified solenoid arrester. Mounted in steel access box with hinged metal access door.
- C. Materials:
  - 1. Box housing: Galvanized steel
  - 2. Arrester: Stainless steel, EPDM O-ring, DOW 111 lubricant
  - 3. Distribution manifold: Type L copper
  - 4. Outlet connection: Brass
  - 5. Solenoid: Plastic housing, brass components
  - 6. Vacuum breaker: Brass
- D. Electrical:
  - 1. 120 VAC. Manufacturer provided 3 amp circuit breaker. Coordinate connection with electrical contractor.
- E. Schedule:
  - 1. Refer to drawings.
  - 2. Coordinate required number of ports and manifolds with floor drains requiring connection.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. Coordinate cutting and forming of roof and floor construction to receive drains to require invert elevations.

**3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Extend clean out to finished floor or wall surface. Lubricate threaded clean out plugs with mixture of graphite and linseed oil. Ensure clearance at clean out for rodding of drainage system. Coordinate all cleanout locations with the architect.
- C. Furnish and install cleanouts at locations as specified and required by local plumbing code.
- D. Install floor clean out at elevation to accommodate finished floor.
- E. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures. Fabricate same size as supply pipe or 3/4 inch minimum and minimum 18 inch long.
- F. Install air gap fittings at all equipment drains when equipment is connected to domestic water.
- G. Coordinate all floor drain locations with associated equipment.
- H. Coordinate all wall mounted device locations with architect.

**END OF SECTION 221119**



**SECTION 223000**  
**PLUMBING EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Diaphragm type expansion tank
- B. In-line circulator pump

**1.02 REFERENCES**

- A. ASHRAE 90A - Energy Conservation in New Building Design
- B. ASME Section 8D - Pressure Vessels
- C. NFPA 30 - Flammable and Combustible Liquids Code
- D. NFPA 54 - National Fuel Gas Code
- E. NFPA 58 - Storage and Handling of Liquefied Petroleum Gases
- F. NFPA 70 - National Electrical Code
- G. UL 174 - Household Electric Storage Tank Water Heaters
- H. ASME Section VIII D - Pressure Vessels; Boiler and Pressure Vessel Codes
- I. ANSI/NEMA 250 - Enclosure for Electrical Equipment (1000 volts max.)
- J. NSF/ANSI 61 - Drinking Water System Components - Health Effects
- K. NSF/ANSI 372 - Drinking Water System Components - Lead Content

**1.03 SUBMITTALS**

- A. Product Data:
  - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
  - 2. Indicate pump type, capacity, power requirements, and affected adjacent construction.
  - 3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
  - 4. Provide electrical characteristics and connection requirements.
- B. Shop Drawings:
  - 1. Indicate heat exchanger dimensions, size of tapings, and performance data.
  - 2. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tapings, and drains.

**1.04 OPERATION AND MAINTENANCE DATA**

- A. Include operation, maintenance and inspection data, replacement part numbers, availability, service depot location, and telephone number.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Provide pumps with manufacturer's name, model number, and rating/capacity identified.
- C. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:
  - 1. American Gas Association (AGA)
  - 2. National Sanitation Foundation (NSF)
  - 3. American Society of Mechanical Engineers (ASME)
  - 4. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI)
  - 5. National Electrical Manufacturers' Association (NEMA)
  - 6. Underwriters Laboratories (UL)

- D. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation; operate within 25% of midpoint of published maximum efficiency curve.

#### **1.06 REGULATORY REQUIREMENTS**

- A. Conform to NSF, NBBPVI, and ANSI/NFPA requirements for water heaters.
- B. Conform to ASME Section VIII D for manufacture of pressure vessels for heat exchangers.
- C. Conform to ASME Section VIII D for tanks.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
- E. Wetted surfaces of brass and bronze components shall contain <0.25% weighted average lead content (lead free) as defined by NSF/ANSI Standards 61 and 372.

#### **1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Deliver, store, protect and handle products to site under provisions of Architectural Specification Sections.
- B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

### **PART 2 PRODUCTS**

#### **2.01 DIAPHRAGM-TYPE EXPANSION TANK**

- A. Manufacturer:
  - 1. Amtrol
  - 2. Taco
  - 3. American Wheatley
  - 4. Engineer approved equal.
- B. Construction: Welded steel, tested and stamped in accordance with Section VIII D of ASME Code; supplied with National Board Form U-1, rated for a maximum allowable working pressure equal to or greater than the pressure of the water heater with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
- C. Accessories: Pressure gauge and air-charging fitting, tank drain; pre-charge to 55 psig. Verify pressure with system water pressure.
- D. Size: When water heater size is over 120 gallons or 200 MBH provide ASME rated tank. Refer to water heater size for requirements.

#### **2.02 IN-LINE CIRCULATOR PUMP**

- A. Manufacturer:
  - 1. B & G
  - 2. Taco
  - 3. Grundfos
  - 4. Engineer approved equal.
- B. Performance: See schedule on drawings.
- C. Casing: Bronze, rated for 125 psig working pressure.
- D. Impeller: Bronze or stainless steel.
- E. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.
- F. Seal: Carbon rotating against a stationary ceramic seat.
- G. Drive: Flexible coupling.

### **PART 3 EXECUTION**

#### **3.01 PUMP INSTALLATION**

- A. Install in accordance with manufacturer's instructions.

- B. Provide air cock and drain connection on horizontal pump casings.
- C. Provide line sized isolating valve and strainer on suction.
- D. Provide line sized soft-seated check valve and balancing valve on discharge.
- E. Decrease from line size with long radius reducing elbows or reducers.
- F. Support piping adjacent to pump such that no weight is carried on pump casings.
- G. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation and operate within 25% of midpoint of published maximum efficiency curve.
- H. Install aquastat on hot water recirculation pipe to control water heater re-circulation pump.
- I. Low voltage wiring shall be by the mechanical contractor unless otherwise noted.

**END OF SECTION 223000**



**SECTION 224000**  
**PLUMBING FIXTURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. See plumbing fixture schedules on drawings.

**1.02 RELATED SECTIONS**

- A. Specification Section 22 0529 - Hangers and Supports for Plumbing Piping and Equipment
- B. Specification Section 22 1116 - Domestic Plumbing Piping
- C. Specification Section 22 1119 - Domestic Plumbing Specialties

**1.03 REFERENCES**

- A. ANSI Z124.2 - Gel-Coated Fiberglass Reinforced Polyester Resin Shower Receptor and Shower Stall Units
- B. ASME A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings
- C. ASME A112.19.2 - Vitreous China Plumbing Fixtures
- D. ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals
- E. NFPA 70 - National Electrical Code
- F. NSF/ANSI 61 - Drinking Water System Components - Health Effects
- G. NSF/ANSI 372 - Drinking Water System Components - Lead Content

**1.04 SUBMITTALS**

- A. Product Data: Provide catalog illustrations of fixtures, sizes, rough in dimensions, utility sizes, trim, and finish.
- B. Manufacturer's Instructions: Indicate installation methods and procedures.
- C. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- D. Warranty: Submit manufacturer's warranty and ensure forms have been completed in owner's name and registered with manufacturer.
- E. The mechanical contractor shall coordinate all fixtures with general construction and cabinetry prior to submitting for review.

**1.05 QUALITY ASSURANCE**

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

**1.06 REGULATORY REQUIREMENTS**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
- B. Wetted surfaces of brass and bronze components shall contain <0.25% weighted average lead content (lead free) as defined by NSF/ANSI Standards 61 and 372.

**1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.



**PART 2 PRODUCTS**

**NOT USED**

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks prior to ordering.
- D. Confirm that hole drillings are of appropriate number and spacing for trim.

**3.02 PREPARATION**

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

**3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install each fixture with trap, easily removable for servicing and cleaning.
- C. Provide chrome plated rigid or flexible supplies to fixtures with 1/4 turn loose key stops, reducers and escutcheons.
- D. Install components level and plumb.
- E. Install and secure fixtures in place with wall supports or wall carriers and bolts.
- F. Seal fixtures to wall and floor surfaces with sealant. Color to match fixture.
- G. Solidly attach water closets to floor with lag screws. Flashing is not intended to hold fixture in place.
- H. Coordinate electronic faucet under deck mixing valve and control module installation such that they do not extend passed the footprint of the plumbing fixture. The control module shall be installed over the low voltage junction box.

**3.04 INTERFACE WITH OTHER PRODUCTS**

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

**3.05 ADJUSTING**

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise or overflow.

**3.06 CLEANING**

- A. Clean plumbing fixtures and equipment.

**END OF SECTION 224000**

**SECTION 230050**  
**BASIC HVAC REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Basic HVAC Requirements specifically applicable to Mechanical Division Specification Sections.
- B. Division 23 Specification requirements also include, by reference, all Division 00 and 01 specification sections. This contractor is responsible to review these specification sections. Requirements of these specification sections are included as a part of this contract.

**1.02 OWNER OCCUPANCY**

- A. The owner will occupy the premises during the construction period.
- B. Limit use of site and premises to allow owner occupancy.
- C. Cooperate with the owner to minimize conflict and to facilitate owner's operations.
- D. Schedule the work to accommodate this requirement.

**1.03 REGULATORY REQUIREMENTS**

- A. This contractor shall give proper authorities all requisite notices relating to work in their charge, obtain official permits, licenses for temporary construction and pay proper fees for it.
- B. This contractor is to be solely answerable for and shall promptly make good all damage, injury or delay to other contractors, to neighboring premises or to persons or property of the public by themselves, by their employees or through any operation under their charge, whether in the contract or extra work.
- C. No attempt has been made to reproduce in these specifications any of the rules or regulations contained in city, state or federal ordinances and codes pertaining to the work covered by these specifications that the contractor be thoroughly familiar with all such ordinances and codes.
- D. The fact that said various rules, regulations and ordinances are not repeated in this specification does not relieve the contractor of the responsibility of making the entire installation in accordance with the requirement of those authorities having jurisdiction.
- E. All work shall comply with the applicable recommendations of:
  - 1. The National Board of Fire Underwriters
  - 2. American Gas Association
  - 3. The National Fire Protection Association (NFPA)
  - 4. The Occupations Safety and Health Act (OSHA)
  - 5. Current IBC Building Code
  - 6. Current applicable city building codes.
  - 7. Current International Energy Conservation Code
- F. Mechanical: Conform to current mechanical code.
- G. Plumbing: Conform to current plumbing code.
- H. Obtain permits and request inspections from authority having jurisdiction.

**1.04 PROJECT/SITE CONDITIONS**

- A. Install work in locations shown on the drawings unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of owner and architect/engineer before proceeding.
- C. This contractor, before submitting their bid, shall visit the site of the project to familiarize themselves with locations and conditions affecting their work.
- D. It is the intent of this specification that the contractor furnishes all labor and material required completing the installation as outlined in the drawings and specifications. No additions to the

contract price shall be allowed due to the failure of this contractor to properly evaluate the effect of existing conditions on the work to be done under this contract.

- E. Whenever renovation or remodeling or relocation of existing equipment is included in the contract, it is imperative that all locations of existing piping, ductwork, equipment, services and grades be noted on the job site before bid is submitted and that all elevations and grades be verified before roughing in new work.
- F. This contractor shall provide holes as necessary for the installation of their work and in accordance with other specification sections in materials other than the structure.

#### **1.05 SEQUENCING AND SCHEDULING**

- A. This contractor shall arrange their work in order that it progresses along with the general construction of the building.
- B. This contractor shall be kept informed as to the work of other trades engaged in the project and shall execute their work in such a manner so as not to delay or interfere with progress of other contractors.
- C. Where space for mechanical and electrical lines and piping is limited, it is imperative that all such trades coordinate their work so as to ensure concealment in space provided. Where conflict exists, the engineer shall decide priority of space. If work is not properly coordinated, the engineer may require removal and relocation of work without additional compensation.

#### **1.06 GUARANTEE**

- A. This contractor shall guarantee all of the apparatus, materials, equipment furnished and labor installed under this contract for a period of one year after date of final acceptance, unless a longer period is specified.
- B. Neither final certificate of payment nor any provisions in the contract documents nor partial or complete occupancy of premises by owner shall constitute an acceptance for work not done in accordance with contract documents or relieve the contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.
- C. Should any defects arise as the result of defective workmanship or material within the guarantee period set forth, this contractor shall make the necessary correction at their own expense.

#### **1.07 ENGINEER APPROVED EQUAL PRODUCTS**

- A. When the engineer, at the request of the interested parties, including the contractor, supplier and manufacturer approved "engineer approved equal" products for this project, such products are approved on the assumption that they will equal or exceed the performance of the products specified.
- B. If such products do not do so after being installed on this project, this contractor shall replace or modify the particular product as necessary to equal the performance of the products specified at no expense to the owner, architect or engineer.
- C. Request for "engineer approved equal" products shall be received by the architect/engineer prior to the last addendum being issued. Requests for substitutions received after this date will not be considered. Substitution requests shall clearly state which products are being considered for substitution. Substitution requests shall include all pertinent product information needed to evaluate the substitution as an "equal".
- D. Similar products shall be all of the same manufacturers and style. There is no exception to this unless prior approval has been granted from engineer.

#### **1.08 OWNER'S RIGHT OF SALVAGE**

- A. Before beginning construction, this contractor shall check and verify with the owner each item of existing equipment that must be removed.

- B. The owner will designate which items of material or equipment not reused that they may wish to keep. The contractor shall then remove these items with care and store in a location designated by the owner for the owner's disposal.
- C. All other items of equipment to be removed and not specified for reuse in new construction or reserved by the owner for their use shall become the property of the contractor and shall be removed from site.

#### **1.09 PROTECTION AND MAINTENANCE**

- A. Where necessary to connect to any existing utility service, this contractor shall contact the owner and shall coordinate any building service connection with the owner so that normal operation to the building is disrupted as little as possible.
- B. Any work to be done in existing structures shall be coordinated with the owner and arrangements made so that traffic flow may be maintained and areas finished where possible before other areas are begun.
- C. This contractor shall protect existing equipment in finished areas from dirt, dust and damage as a result of their work.
- D. Protect any building openings from unauthorized entry. Coordinate with owner where building entry must be controlled.

#### **1.10 DEMOLITION**

- A. This contractor shall be responsible for the demolition and removal of all existing mechanical elements within the project area except as follows:
  - 1. Elements shown on the drawings as "existing to remain and/or to be relocated".
  - 2. Elements serving adjacent areas.
  - 3. Elements required for the support of the newly remodeled areas.
  - 4. All elements to be removed are subject to the Owner's Right of Salvage.
- B. Preserve services to the existing facility. Extend/reroute/reconnect existing systems as required providing for the continued function of these systems.

#### **1.11 CUTTING AND PATCHING**

- A. This contractor shall do all cutting and patching necessary for the installation of their work in all existing and new buildings unless otherwise noted.
- B. This contractor shall arrange for openings in the building as required for the installation of equipment furnished under this contract. Where ductwork and piping must be extended or changed, patching with concrete will be done in the building. Patching shall be at both the top and bottom of sleeves where above grade.
- C. This contractor shall do all cutting and patching required for their work beyond the remodeled areas unless otherwise noted. All finish work shall include patching to match existing adjacent surfaces. Painting shall be by others.

#### **1.12 CLEANING AND RUBBISH**

- A. This contractor, upon completion of their work, shall remove all rubbish and debris resulting from their operation and shall remove it from site at their own expense.
- B. In so far as their work is concerned, all equipment shall be cleaned and the premises left in first class condition.
- C. At the end of each working day, this contractor shall remove all of their debris, rubbish, tools and surplus materials from the project work area. The work area shall be broom clean and left in a neat and orderly condition. The contractor for the removal of debris from the project shall not use the owner's waste disposal facility.

#### **1.13 ELECTRICAL CONNECTIONS**

- A. This contractor shall turn over all magnetic starters, thermal protective switches, and speed changing switches furnished under this contract for all motor driven equipment to the electrical

contractor who will install such starters and switches and wire them to their respective motors as a part of the electrical contract.

#### **1.14 HAZARDOUS MATERIALS**

- A. If the contractor stores any hazardous solvents or other materials on the site, they shall obtain copies of the safety data sheets for the materials and post them on the site. The contractor shall inform the owner and all employed of any potential exposure to this material.
- B. At no time shall any product containing asbestos be incorporated into the work.
  - 1. If asbestos materials are encountered, report to the owner. The owner will be responsible for asbestos removal.

#### **1.15 RECORD DRAWINGS**

- A. This contractor shall provide at the conclusion of the project one clean, non-torn, neat, and legible "as-built" set of drawings to the owner. These drawings shall show the routing of pipes, ductwork and equipment drawn in at scaled locations. All dimensions indicated shall be referenced to a column line. A set of construction blue prints will be furnished for this work.
- B. All mechanical systems installed shall be shown on the "as-built" drawings. This includes all addendum items and change orders.
- C. Refer to respective architectural specification section for additional information.
- D. This contractor shall update these drawings during the project at least every week.

#### **1.16 REVIEW OF MATERIALS**

- A. This contractor shall submit to the engineer for review one (1) electronic copy giving a complete list of materials and equipment they propose to furnish. The brochure shall contain complete information as to the make of equipment, type, size, capacities, dimensions and illustration. One of these returned copies shall be kept on the job at all times.
- B. Checking of submittal drawings by the engineer does not relieve the contractor of the responsibility for the accuracy of such drawings and for their conformity to drawings and specifications unless the contractor notifies engineer in writing of such deviation at time such drawings are furnished.
- C. All submittals shall have the date marked on them when the contractor receives them from the supplier. Submittals shall be submitted through the contractor and shall not come direct from the supplier to the architect or engineer.
- D. This contractor shall mark the date and sign each set that they have checked each of them in their entirety before submitting to the engineer. Submittals that are not dated and signed by the contractor will not be accepted, or checked and will be marked "resubmit" and sent back to the contractor.

#### **1.17 TEST OF SYSTEMS**

- A. This contractor, before concealed, shall test all systems installed under this contract as called for in these specifications and as required by local codes. Tests shall be made in the presence of the engineer, local authorities or their duly authorized representative. Any defects discovered in testing shall be corrected and the tests repeated until all defects are eliminated.
- B. This contractor shall be held responsible for all damage resulting from defects in the system.
- C. After completion of installation, the systems shall be given tests under full operating conditions and pressures and all adjustments shall be made to make the system operative as required. All safety devices shall be tested for correct operation.

#### **1.18 SCOPE OF WORK**

- A. All work shall be performed by well-qualified and licensed mechanics with a thorough knowledge of the various systems involved in this building. It shall be this contractor's responsibility to see that their mechanics are familiar with all the various codes and tests applicable to this work.

- B. All equipment shall be new and of the type as specified by the engineer unless otherwise noted in these specifications or on the drawings to remain and or be reused.
- C. The intent of the drawings and specifications is for complete installation of the systems outlined in the drawings and specifications so that at the conclusion of construction the system will be turned over to the owner complete and ready for safe and efficient operation.
- D. This contractor shall be required to furnish and install all such items normally included on systems of this type, which, while not mentioned directly herein or on the drawings are obviously essential to the installation and operation of the system and which are normally furnished on quality installation of this type. The drawings and specifications cannot deal individually with the many minute items that may be required by the nature of the systems.
- E. If there is a discrepancy between the drawings and the specifications or within either document, the more stringent requirement shall be estimated unless brought to the engineer's attention and an addendum is issued for clarification.
- F. The HVAC Contractor shall establish system elevations prior to fabrication and installation. The HVAC Contractor shall coordinate elevations with other trades. All elevations shall be coordinated with all trades in the field prior to installation. When a conflict between trades arises, the design team shall be notified immediately prior to further installation however priority shall be as follows:
  - 1. Lighting Fixtures
  - 2. Gravity flow piping, including condensate
  - 3. Sheet metal
  - 4. Cable trays, including access space
  - 5. Other piping
  - 6. Conduits and wireway

#### **1.19 VERIFICATION OF ELEVATION OF EXISTING LINES**

- A. This contractor shall before starting any new work, verify the elevations of all existing piping to which they must connect under this contract. The contractor shall report any discrepancies between drawing elevations and actual elevations to the engineer before proceeding with the work. Failure of the contractor to do so shall make them liable for the cost of extra work involved.

#### **1.20 CLEANING OF MECHANICAL SYSTEMS**

- A. This contractor shall thoroughly clean all rust, grease, plaster, cement, etc., from all equipment, ductwork and piping furnished and installed by them as required to leave surfaces suitable for finish painting.
- B. This contractor shall keep all pipes, ducts, etc., plugged, drained or otherwise protected during construction. All items of mechanical equipment shall be suitably protected and upon completion of project shall be equal to new condition.

#### **1.21 ALTERNATES**

- A. Refer to General Specification Sections for alternate bid description.

#### **1.22 DIGITAL MEDIA AGREEMENT**

- A. Computer Aided Drafting (CAD) documents may be available to the contractor for some uses. Contact the engineer prior to bidding to determine what information is available to be transmitted to the contractor in digital form.
- B. When documents are determined to be available, and as requested by the contractor, they will be transmitted upon the completion and execution of the MODUS digital media agreement.

Clinton County Conservation  
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**PART 2 PRODUCTS**

**NOT USED**

**PART 3 EXECUTION**

**NOT USED**

**END OF SECTION 230050**

**SECTION 230529**

**HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pipe hangers and supports
- B. Accessories
- C. Flashing

**1.02 RELATED SECTIONS**

- A. Specification Section 232300 - Refrigerant Piping

**1.03 REFERENCES**

- A. ASME B31.1 - Power Piping
- B. ASME B31.2 - Fuel Gas Piping
- C. ASME B31.5 - Refrigeration Piping
- D. ASME B31.9 - Building Services Piping
- E. ASTM F708 - Design and Installation of Rigid Pipe Hangers
- F. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer
- G. MSS SP69 - Pipe Hangers and Supports - Selection and Application
- H. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices

**1.04 SUBMITTALS**

- A. Product Data: Provide manufacturers catalog data including load capacity.
- B. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- C. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

**1.05 REGULATORY REQUIREMENTS**

- A. Conform to applicable code for support of piping.

**PART 2 PRODUCTS**

**2.01 PIPE HANGERS AND SUPPORTS**

- A. Manufacturers:
  - 1. Anvil International International
  - 2. Cooper B-Line/Tolco
  - 3. Engineer approved equal.
- B. Refrigerant Piping:
  - 1. Conform to ASME B31.5 or ASTM F708.
  - 2. Hangers for Pipe Sizes 1/2" to 1-1/2": Carbon steel adjustable swivel, split ring.
  - 3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  - 4. Vertical Support: Steel riser clamp.
  - 5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  - 6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
  - 7. Exterior Support: Zinc coated Unistrut.
  - 8. Provide zinc coated (hot dipped galvanized) hangers and supports for all exterior applications.



**2.02 ACCESSORIES**

- A. Hanger Rods: Mild steel threaded both ends, threaded one end or continuous threaded.

**2.03 FLASHING**

- A. Metal Flashing: 26 gauge galvanized steel.
- B. Metal Counter Flashing: 22 gauge galvanized steel.
- C. Flexible Flashing: 47 mil thick sheet butyl compatible with roofing.
- D. Caps: Steel, 22 gauge minimum; 16 gauge at fire resistant elements.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.

**3.02 PIPE HANGERS AND SUPPORTS**

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- C. Place hangers within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- F. Support riser piping independently of connected horizontal piping.
- G. Provide copper plated hangers and supports for copper piping.
- H. Design hangers for pipe movement without disengagement of supported pipe.
- I. Support vertical piping every ten feet or on every floor.

**3.03 SCHEDULES**

<b>HANGER ROD</b>	<b>MAX. HANGER SPACING</b>	<b>DIAMETER</b>
<b>Pipe Size</b>	<b>Feet</b>	<b>Inches</b>
1/2 to 1-1/4	6.5	3/8

**END OF SECTION 230529**

**SECTION 230553**  
**IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nameplates
- B. Tags
- C. Labels
- D. Schedule

**1.02 REFERENCES**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems

**1.03 SUBMITTALS**

- A. Submit list of wording, symbols, letter size, and color-coding for mechanical identification.
- B. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Manufacturer's Instructions: Indicate installation instructions, special procedures, and installation.
- E. Project Record Documents: Record actual locations of tagged valves, include valve tag numbers.

**PART 2 PRODUCTS**

**2.01 NAMEPLATES**

- A. Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

**2.02 TAGS**

- A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- B. Information Tags: Clear plastic with printed "Danger, "Caution" or "Warning" and message; size 3-1/4" x 5-5/8" with grommet and self-locking nylon ties.
- C. Tag Chart: Typewritten letter size list in anodized aluminum frame plastic laminated.

**2.03 LABELS**

- A. Description: Laminated Mylar, size 1.9" x 0.75" adhesive backed with printed identification.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. De-grease and clean surfaces to receive adhesive for identification materials.

**3.02 INSTALLATION**

- A. Install identifying devices after completion of coverings and painting.
- B. Install plastic nameplates with corrosive-resistant mechanical fasteners or adhesive.
- C. Install labels with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer. Apply paint primer before applying labels for unfinished canvas covering.
- D. Install tags using corrosion resistant chain. Number tags consecutively by location.
- E. Tag automatic controls, instruments, and relays. Key to control schematic.

- F. Identify piping, concealed or exposed as indicated in schedule below. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure and at each obstruction. Identify on both sides of any wall.
- G. Conform to owner's existing identification scheme. Verify with owner prior to bid.

**3.03 IDENTIFICATION SCHEDULE**

<b>Component</b>	<b>Identification</b>
All Valves	Tags
Control Panels and Other Major Control Components	Plastic Nameplates
Automatic Controls, Instruments, Relays	Tags
Piping (Larger than 3/4")	Plastic Tape Pipe Markers
Piping (3/4" and Smaller)	Tags
Ductwork	None

**END OF SECTION 230553**

**SECTION 230593**  
**TESTING, ADJUSTING, AND BALANCING FOR HVAC**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Testing, adjustment, and balancing of air systems

**1.02 REFERENCES**

- A. AABC - National Standards for Total System Balance
- B. ADC - Test Code for Grilles, Registers, and Diffusers
- C. ASHRAE 111 - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems
- D. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems
- E. SMACNA - HVAC Systems Testing, Adjusting, and Balancing

**1.03 SUBMITTALS**

- A. Submit name of adjusting and balancing agency for approval within 30 days after award of Contract.
- B. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- C. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.
- D. Submit draft copies of report for review prior to final acceptance of project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.
- E. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
- F. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty prior to commencing system balance.
- G. Test Reports: Indicate data on AABC National Standards for Total System Balance Forms.

**1.04 PROJECT RECORD DOCUMENTS**

- A. Record actual locations of flow measuring stations, balancing valve, and rough setting.

**1.05 QUALITY ASSURANCE**

- A. Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance.
- B. Maintain one copy of each document on site.

**1.06 QUALIFICATIONS**

- A. Independent agency specializing in the testing, adjusting and balancing of systems specified in this section with minimum three years experience.
- B. Perform work under supervision of AABC Certified Test and Balance Engineer or NEBB Certified Testing, Balancing and Adjusting Supervisor.

**1.07 PRE-BALANCING CONFERENCE**

- A. Convene a conference one week prior to commencing work of this section.

**1.08 SEQUENCING**

- A. Sequence work to commence after completion of systems and schedule completion of work before substantial completion of project.

### **1.09 SCHEDULING**

- A. Schedule and provide assistance in final adjustment and test of life safety system with the fire authority.

### **PART 2 PRODUCTS**

#### **NOT USED**

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
  - 1. Systems are started and operating in a safe and normal condition.
  - 2. Temperature control systems are installed complete and operable.
  - 3. Proper thermal overload protection is in place for electrical equipment.
  - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
  - 5. Duct systems are clean of debris.
  - 6. Fans are rotating correctly.
  - 7. Fire, smoke, and volume dampers are in place and open.
  - 8. Air coil fins are cleaned and combed.
  - 9. Access doors are closed and duct end caps are in place.
  - 10. Air outlets are installed and connected.
  - 11. Duct system leakage is minimized.
  - 12. Pumps are rotating correctly.
  - 13. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies noted during performance of services that prevents system balance.
- C. Beginning of work means acceptance of existing conditions.

#### **3.02 PREPARATION**

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to the engineer to facilitate spot checks during testing.
- B. Provide additional balancing devices as required.

#### **3.03 INSTALLATION TOLERANCES**

- A. Air Outlets and Inlets: Adjust total to within + 10% and - 5% of design to space. Adjust outlets and inlets in space to within +/- 10% of design.

#### **3.04 ADJUSTING**

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the owner.
- F. Check and adjust systems approximately six months after final acceptance and submit report.

### 3.05 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extent those adjustments do not create objectionable air motion or sound levels. Affect the volume control by duct internal devices (such as dampers and splitters).
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50% loading of filters.

### 3.06 SCHEDULES

- A. Equipment Requiring Testing, Adjusting, and Balancing:
  - 1. Plumbing Pumps
  - 2. Energy Recovery Units
  - 3. Forced Air Furnaces
  - 4. Fans
  - 5. Air Inlets and Outlets
- B. Report Forms
  - 1. Title Page:
    - a. Name of Testing, Adjusting, and Balancing Agency
    - b. Address of Testing, Adjusting, and Balancing Agency
    - c. Telephone number of Testing, Adjusting, and Balancing Agency
    - d. Project Name
    - e. Project Location
    - f. Project Architect
    - g. Project Engineer
    - h. Project Contractor
    - i. Project Altitude
    - j. Report Date
  - 2. Summary Comments:
    - a. Design versus final performance.
    - b. Notable characteristics of system.
    - c. Description of systems operation sequence.
    - d. Summary of out door and exhaust flows to indicate amount of building pressurization.
    - e. Nomenclature used throughout report.
    - f. Test conditions.
  - 3. Instrument List:
    - a. Instrument
    - b. Manufacturer
    - c. Model number
    - d. Serial number
    - e. Range
    - f. Calibration date

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4. Electric Motors:
  - a. Manufacturer
  - b. Model/Frame
  - c. HP/BHP
  - d. Phase, voltage, amperage; nameplate, actual, no load
  - e. RPM
  - f. Service factor
  - g. Starter size, rating, heater elements
  - h. Sheave Make/Size/Bore
5. Pump Data:
  - a. Identification/number
  - b. Manufacturer
  - c. Size/Model
  - d. Impeller
  - e. Service
  - f. Design flow rate, pressure drop, BHP
  - g. Actual flow rate, pressure drop, BHP
  - h. Discharge pressure
  - i. Suction pressure
  - j. Total operating head pressure
  - k. Shut off, discharge and suction pressures
  - l. Shut off, total head pressure
6. Exhaust Fan Data:
  - a. Location
  - b. Manufacturer
  - c. Model number
  - d. Serial number
  - e. Air flow, specified and actual
  - f. Total static pressure (total external), specified and actual
  - g. Inlet pressure
  - h. Discharge pressure
  - i. Sheave Make/Size/Bore
  - j. Number of Belts/Make/Size
  - k. Fan RPM
7. Air Distribution Test Sheet:
  - a. Air terminal number
  - b. Room number/location
  - c. Terminal type
  - d. Terminal size
  - e. Area factor
  - f. Design velocity
  - g. Design air flow
  - h. Test (final) velocity
  - i. Test (final) air flow
  - j. Percent of design air flow

**END OF SECTION 230593**

**SECTION 230713**  
**DUCT INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fiberglass (flexible duct wrap)
- B. Fiberglass (duct liner)

**1.02 RELATED SECTIONS**

- A. Specification Section 233100 - HVAC Ducts and Casings
- B. Specification Section 233300 - Air Duct Accessories

**1.03 REFERENCES**

- A. ASTM C518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- B. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation
- C. ASTM C1071 - Standard Specification for Thermal and Acoustical Insulation (Fiberglass, Duct Lining Material)
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- E. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
- F. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source
- G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
- H. ASTM C1290: Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts
- I. ASTM C1338: Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
- J. NAIMA National Insulation Standards
- K. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials
- L. SMACNA - HVAC Duct Construction Standards - Metal and Flexible
- M. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials

**1.04 SUBMITTALS**

- A. Product Data: Provide product description, thermal characteristics, and list of materials and thickness for each service and locations.
- B. Manufacturer's Installation Instructions: Indicate procedures that ensure acceptable workmanship and installation standards will be achieved.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section approved by manufacturer.

**1.06 REGULATORY REQUIREMENTS**

- A. Materials: Flame spread/smoke developed rating of 25/50 in accordance with ASTM E84.
- B. Identification: External duct insulation and factory insulated flexible duct shall be legibly printed or identified at intervals not greater than 36 inch with name of manufacturer, the thermal



resistance R-value at the specified thickness; and the flame spread and smoke developed indexes of the composite material.

### **1.07 DELIVERY, STORAGE AND PROTECTION**

- A. Deliver, store, protect and handle products to site.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

### **1.08 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

## **PART 2 PRODUCTS**

### **2.01 FIBERGLASS (FLEXIBLE DUCT WRAP)**

- A. Manufacturers:
  - 1. Owens Corning
  - 2. Knauff
  - 3. Johns Manville
  - 4. CertainTeed
  - 5. Engineer approved equal.
- B. Insulation: ASTM C1290; flexible, noncombustible blanket.
  - 1. "K" Value: ASTM C518, 0.27 at 75 deg F.
  - 2. Installed R-value (compressed to 25%) for 1-1/2": 4.5
  - 3. Maximum Service Temperature: ASTM C411; 250 deg F.
  - 4. Maximum Moisture Absorption: ASTM C1104; 5% by weight
  - 5. Density: 1.0 lb./cu. ft. (0.75 lb/cu ft for attic insulation)
  - 6. Microbial Growth: ASTM C1338; does not support the growth of mold, fungi and bacteria.
  - 7. Maximum Flame Spread/Smoke Developed Index: ASTM E84; 25/50
- C. Vapor Barrier Jacket:
  - 1. Kraft paper reinforced with fiberglass yarn and bonded to aluminized film.
  - 2. Maximum Moisture Vapor Transmission: ASTM E96; 0.02 perm.
- D. Vapor Barrier Tape Pressure sensitive tape approved by the manufacturer.

### **2.02 FIBERGLASS (DUCT LINER)**

- A. Manufacturers:
  - 1. Johns Manville Permacote Linacoustic
  - 2. Owens Corning
  - 3. CertainTeed Ultralite
  - 4. Knauff
  - 5. Engineer approved equal.
- B. Insulation:
  - 1. ASTM C1071, flexible noncombustible blanket air surface coated with acrylic coating treated with ASTM G21 and G22 anti-microbial agent to resist growth.
  - 2. "K" Value: ASTM C518, 0.25 at 75 deg F.
  - 3. Maximum Service Temperature: 250 deg F.
  - 4. Maximum Velocity on Coated Air Side: 5,000 FPM
  - 5. Noise Reduction Coefficient: 0.50 or higher in accordance with ASTM C423. (1/2" thickness)

- a. Noise reduction coefficient will drive density for each manufacturer may vary by manufacturer to achieve.
- 6. Maximum Flame Spread/Smoke Developed Index: ASTM E84; 25/50
- C. Adhesive: Adhesive: ASTM C916 adhesive as recommended by manufacturer.
- D. Liner Fasteners: Galvanized steel welded with integral head.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that ductwork has been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed and dry.

**3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Insulated Ductwork Conveying Air Below Ambient Temperature:
  - 1. Provide insulation with vapor barrier jackets.
  - 2. Finish with tape and vapor barrier jacket.
  - 3. Continue insulation through walls, sleeves, hangers and other duct penetrations.
  - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, expansion joints, reheat coils, and any other item exposed to ductwork air temperature.
- C. Insulated Ductwork Conveying Air Above Ambient Temperature:
  - 1. Provide with standard vapor barrier jacket.
  - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- D. Duct Liner Application:
  - 1. Adhere insulation with adhesive for 100% coverage.
  - 2. Secure insulation with mechanical liner fasteners. Refer to SMACNA Standards for spacing. Pin length as required to limit compression of liner.
  - 3. Seal and smooth joints. Seal and coat all exposed edges.
  - 4. Seal liner surface penetrations with adhesive.

**3.03 SCHEDULES**

**FIBERGLASS FLEXIBLE DUCT WRAP**

DUCTWORK	THICKNESS
Supply Ducts	1-1/2"
Outside Air Intake Duct	2"
Ductwork Exposed to the Garage Spaces	3"

**FIBERGLASS DUCT LINER**

DUCTWORK	THICKNESS
Transfer Air Duct	1/2"

- A. Do not wrap or insulate any exposed supply, return or exhaust duct located in normally occupied areas.

**END OF SECTION 230713**



**SECTION 230719  
HVAC PIPING INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Flexible elastomeric cellular insulation (Chilled, refrigerant)
- B. Piping jackets

**1.02 RELATED SECTIONS**

- A. Specification Section 23 2300 - Refrigerant Piping

**1.03 REFERENCES**

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus
- B. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
- C. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- E. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
- F. NAIMA National Insulation Standards
- G. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials
- H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials

**1.04 SUBMITTALS**

- A. Product Data: Provide product description, thermal characteristics, list of materials, and thickness for each service and locations.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years experience.

**1.06 REGULATORY REQUIREMENTS**

- A. Conform to maximum flame spread/smoke developed rating of 25/50 in accordance with ASTM E84.

**1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Accept materials on site, labeled with manufacturer's identification, product density and thickness.

**1.08 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

**PART 2 PRODUCTS**

**2.01 FLEXIBLE ELASTOMERIC CELLULAR INSULATION**

- A. Manufacturers:
  - 1. Armacell: AP Armaflex
  - 2. Aerocel
  - 3. K-flex

4. Engineer approved equal.
- B. Insulation: ASTM C534 flexible cellular elastomeric molded foam
- C. "K" Value: ASTM C177 or C518; 0.27 at 75 deg F.
- D. Minimum Service Temperature: -40 deg F.
- E. Maximum Service Temperature: 220 deg F.
- F. Maximum Moisture Absorption: ASTM D1056, 5.0% by weight gain
- G. Maximum Water Vapor Permeability: ASTM E96; 0.05 perm-in
- H. Maximum Flame Spread: ASTM E84; 25
- I. Maximum Smoke Developed: ASTM E84; 50
- J. Insulated Pipe Hangers: Refer to the requirements for elastomeric insulation contained in the Inserts and Shields portion of this section.
- K. Elastomeric Foam Adhesive:
  1. Manufacturers:
    - a. Armstrong #BLV 520
    - b. Halstead/K-Flex
    - c. Aeroflex
    - d. Engineer approved equal.
  2. Air-dried contact adhesive, compatible with insulation
  3. VOC Content: 0 g/L as calculated and reported by SCAQMD 1168

## 2.02 PIPING JACKETS

- A. Aluminum: ASTM C1729 and B209 formed aluminum sheet with laminated interior.
  1. Thickness: 0.016" sheet
  2. Finish: Embossed.
  3. Joining: Longitudinal slope joints and two inch (2") laps. Locate seams on the bottom of the pipe.
  4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
  5. Metal Jacket Bands: 3/8 inch wide and 0.02" thick aluminum.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry with foreign material removed.

### 3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. Insulated Dual Temperature Pipes or Cold Pipes Conveying Fluids Below Ambient Temperature:
  1. Provide vapor barrier jackets, factory applied or field applied.
  2. Insulate fittings, joints and valves with molded insulation of like material and a thickness as adjacent pipe.
  3. Continue insulation through walls (unless in firewall sleeves), pipe hangers and other pipe penetrations.
  4. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
  5. Vapor seal insulation ends every 20 feet.
- D. Insulated Pipes Conveying Fluids Above Ambient Temperature:
  1. Provide standard jackets with vapor barrier, factory applied.

2. Insulate fittings, joints and valves with insulation of like material and thickness as adjoining pipe.
  3. Hot piping conveying fluids 140 deg F or less do not insulate flanges and unions at equipment, but level and seal ends of insulation.
  4. Hot piping conveying fluids over 140 deg F, insulate flanges and unions at equipment.
- E. Inserts and Shields:
1. Manufacturers:
    - a. Jeff Company/Buckaroo
    - b. Armacell
    - c. Cooper/Eaton
    - d. TPS
    - e. Engineer approved equal.
  2. Shields: Galvanized saddle with flared edges between pipe hangers or pipe hanger rolls and inserts.
  3. Insert Location: Between support shield and piping and under the vapor barrier and finish jacket.
  4. Insert Configuration: Minimum six inch (6") long of same thickness and contour as adjoining insulation; may be factory fabricated.
  5. Insert Type:
    - a. Polystyrene and Fiberglass Insulation: 360 degree polyisocyanurate or phenolic foam cylindrical insert capable of supporting piping system. Pre-fabricated, insulated and jacketed supports are acceptable. Blocks, plugs, or wood material are not acceptable.
    - b. Closed Cell (Elastomeric) Insulation: Pre-fabricated 360 degree insulated pipe hanger with polyethylene inserts (Armacell "Armafix" or equal). Match thickness of pipe insulation. Hanger shall have PVC or aluminum jacket. Provide friction tape on inside of pipe clamp/support to avoid slipping.
- F. Insulation shall be continuous at all hangers. Hanger shall not be in direct contact with pipe.
- G. Heat traced piping insulate fittings, joints and valves with insulation of like material, thickness and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer.

### 3.03 TOLERANCE

- A. Substituted insulation materials shall provide thermal resistance within 10% at normal conditions, as materials indicate.

### 3.04 SCHEDULE

#### FLEXIBLE ELASTOMERIC FOAM INSULATION

PIPING SYSTEMS	PIPE SIZE	THICKNESS
Refrigerant Suction Lines:	ALL	1"
Refrigerant Liquid Lines:	ALL	1"

- A. Note: Pre-insulated refrigerant piping from the manufacturer shall be approved for use.

#### PIPE JACKET SCHEDULE

PIPE LOCATION	JACKET MATERIAL
Exterior Piping	Aluminum

- B. Note: Jacketing shall cover the entire piping system including, but not limited to the pipe, joints, fittings and tees.

**END OF SECTION 230719**



**SECTION 231123**  
**NATURAL GAS PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Natural gas piping
- B. Flanges, unions, and couplings
- C. Plug valves
- D. Gas ball valves

**1.02 REFERENCES**

- A. ANSI LC-4/CSA 6.32 Press-connect Metallic Fittings for Use in Fuel Gas Distribution Systems
- B. ASHRAE 90A - Energy Conservation in New Building Design
- C. ASME Section 8D - Pressure Vessels
- D. ASME B16.3 Standard for Malleable Iron Threaded Fittings: Classes 150 and 300
- E. ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- F. ASTM A420 Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service
- G. NFPA 30 - Flammable and Combustible Liquids Code
- H. NFPA 54 - National Fuel Gas Code
- I. NFPA 70 - National Electrical Code

**1.03 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three-years experience.
- B. Provide Welder's Certificate: Include Welder's Certification of Compliance with ASME Section IX.

**1.04 REGULATORY REQUIREMENTS**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

**1.05 DELIVERY, STORAGE, AND PROTECTION**

- A. Deliver, store, protect and handle products to the site.
- B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

**PART 2 PRODUCTS**

**2.01 NATURAL GAS PIPING (ABOVE GRADE)**

- A. Steel Pipe:
  - 1. ASTM A53 Schedule 40 black.
  - 2. Fittings: ASME B16.3, malleable iron or ASTM A234/A234M, forged steel welding type.
  - 3. Joints: NFPA 54, threaded or welded to ANSI B31.1.

**2.02 NATURAL GAS PIPING (PRESS FITTINGS)**

- A. Manufacturers:
  - 1. Viega (MegaPressG)
  - 2. Nibco (BenchPressG)
  - 3. Engineer approved equal.
- B. Material:



1. Steel Pipe:
  - a. ASTM A53 Schedule 40 black.
  - b. Fittings: Cold press mechanical joint fittings conforming to material requirements of ASTM A420 or ASME B16.3 and performance criteria ANSI LC-4/CSA 6.32. Sealing elements for press fittings shall be HNBR. Sealing elements shall be factory installed and of the same manufacturer.
  - c. Valves: Cold press mechanical joint valves conforming to criteria ANSI LC-4/CSA 6.32. Additional valve specific requirements can be found elsewhere in this section.
- C. Application:
  1. Press fittings used in natural gas piping systems shall be limited in use to systems where gas pressure is 5 PSI or below and where piping is installed in accessible locations.
  2. Press fittings are not approved for installation in chases, above inaccessible ceilings, or below grade.
  3. All piping, fittings, and accessories using cold press mechanical joints shall comply with ANSI LC-4/CSA 6.32, the latest edition of NFPA-54, and any other applicable local codes.
  4. Authority Having Jurisdiction may have more strict requirements for press fitting usage in natural gas applications. Contractor shall confirm requirements of local authority prior to submitting press fittings for review and include any additional requirements as notes/comments in natural gas piping submittal.

### **2.03 FLANGES, UNION, AND COUPLINGS**

- A. Pipe Size Under 2 Inches:
  1. Ferrous Pipe: Class 150 psig malleable iron threaded unions.
  2. Copper Tube and Pipe: Class 150 psig bronze unions with soldered joints.
- B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, and water impervious isolation barrier.

### **2.04 PLUG VALVES**

- A. Up To and Including 2 Inches:
  1. Manufacturers:
    - a. Homestead Valve #612
    - b. Engineer approved equal.
  2. Full port body, lubricated plug type, without taper, close tolerance between plug and body sealing surfaces, Teflon reinforced stem seal, leak-proof spring loaded check valve, combination lubricant screw and button head. Valve plugs shall be floated on low-friction Teflon surfaces. Lubricant system shall have sufficient pressure to force lubricant over all seating surfaces.
  3. Valves shall handle natural gas at temperature and pressure indicated.

### **2.05 GAS BALL VALVES**

- A. Up To and Including 2 Inches:
  1. Manufacturers:
    - a. Apollo #80-100
    - b. Watts #B-6000-UL
    - c. Nibco #T-580-70-UL
    - d. Engineer approved equal.
  2. Bronze two piece body, standard or full port, chrome plated ball, Teflon seats and stuffing box ring, lever handle, threaded ends. UL listed for natural gas service.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. This contractor shall furnish all labor and material necessary to install gas piping to all items of equipment shown on the drawings as requiring gas.
- B. Accessible piping smaller than two inch (2") may be screwed.

- C. All concealed gas pipe and all gas piping two inch (2") and larger shall be fabricated using weld type fittings.
- D. All steel gas piping buried in earth shall be Schedule 40 black steel mill wrapped and all joints shall be welded.
- E. All gas piping shall be tested at 50-psi air pressure for a 24-hour period.
- F. This contractor shall furnish and install a gas cock shut off in the branch line to each gas-consuming piece of equipment. Provide plug valves where noted on the plans.
- G. All gas piping that is run exposed to weather shall be given two coats of rust resisting paint.
- H. All gas piping in trenches, tunnels and concealed above inaccessible ceilings shall be welded construction.
- I. All gas piping carrying 1 psig or more shall be welded.
- J. Install horizontal press pipe fittings with pipe supports no further than 2 feet from either end of fitting to prevent pipe sag that could affect integrity of fitting connection.
- K. Install rigid gas piping free of sags or bends.

**3.02 GAS REVISIONS**

- A. The present natural gas service shall remain in its' present location. This contractor shall connect to the present gas manifold and shall re-work manifold as required.

**END OF SECTION 231123**



**SECTION 232300**  
**REFRIGERANT PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Piping

**1.02 RELATED SECTIONS**

- A. Specification Section 235400 - Furnaces

**1.03 REFERENCES**

- A. ASHRAE 34 - Number Designation of Refrigerants
- B. ASME - Boiler and Pressure Vessel Codes, SEC 9 - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
- D. ASME B16.26 - Cast Copper Alloy Fittings For Flared Copper Tubes
- E. ASTM B280 - Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
- F. ASTM F708 - Design and Installation of Rigid Pipe Hangers
- G. AWS A5.8 - Brazing Filler Metal
- H. AWS D1.1 - Structural Welding Code, Steel
- I. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer
- J. MSS SP69 - Pipe Hangers and Supports - Selection and Application
- K. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices
- L. UL 429 - Electrically Operated Valves

**1.04 SYSTEM DESCRIPTION**

- A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union and couplings for servicing are consistently provided.
- B. Provide pipe hangers and supports in accordance with ASTM B31.5 unless indicated otherwise.
- C. Flexible Connectors: Utilize at or near compressors where piping configuration does not absorb vibration.

**1.05 SUBMITTALS**

- A. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes.
- B. Product Data: Provide general assembly of specialties, including manufacturers catalog information. Provide manufacturers catalog data including load capacity.
- C. Design Data: Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- D. Test Reports: Indicate results of leak test, acid test.
- E. Manufacturer's Installation Instructions: Indicate support, connection requirements and isolation for servicing.
- F. Submit Welder's Certification of Compliance with ASME SEC 9.

**1.06 PROJECT RECORD DOCUMENTS**

- A. Record exact locations of equipment and refrigeration accessories on record drawings.

### **1.07 OPERATION AND MAINTENANCE DATA**

- A. Maintenance Data: Include instructions for changing cartridges, assembly views, and spare parts lists.

### **1.08 QUALIFICATIONS**

- A. Installer: Company specializing in performing the work of this section with minimum three years experience.
- B. Design piping system under direct supervision of a professional engineer experienced in design of this work and licensed in Iowa.

### **1.09 REGULATORY REQUIREMENTS**

- A. Conform to ASME B31.9 for installation of piping system.
- B. Welding Materials and Procedures: Conform to ASME SEC 9 and applicable state labor regulations.
- C. Welder's Certification: In accordance with ASME SEC 9.
- D. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.

### **1.10 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, protect and handle products to site under provisions of Architectural Specification.
- B. Deliver and store piping and specialties in shipping containers with labeling in place.
- C. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
- D. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

## **PART 2 PRODUCTS**

### **2.01 PIPING**

- A. Copper Tubing: ASTM B280, type #ACR hard drawn or annealed.
  - 1. Fittings: ASME B16.22 wrought copper.
  - 2. Joints: Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range of 1190 to 1480 deg F.
- B. Copper Tubing to 7/8 inch OD: ASTM B88, type #K, annealed.
  - 1. Fittings: ASME B16.26 cast copper.
  - 2. Joints: Flared.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

### **3.02 INSTALLATION**

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner with plumbing parallel to building structure and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations and locations. Slope piping 1% in direction of oil return.

- E. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.
- F. Arrange piping to return oil to compressor. Provide traps and loops in piping and provide double risers as required. Slope horizontal piping 0.40% in direction of flow. Pipe size to be provided by unit manufacturer.
- G. Provide clearance for installation of insulation and access to valves and fittings.
- H. Provide access to concealed valves and fittings. Coordinate size and location of access doors.
- I. Flood piping system with nitrogen when brazing.
- J. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.
- K. Prepare unfinished pipe, fittings, supports, and accessories ready for finish painting.
- L. Insulate piping and equipment.
- M. Follow ASHRAE 15 procedures for charging and purging of systems and for disposal of refrigerant.
- N. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.
- O. Fully charge completed system with refrigerant after testing.
- P. Evacuate system to 27 inches vacuum and hold at that level for 1 hour prior to charging system with refrigerant.

### **3.03 FIELD QUALITY CONTROL**

- A. Field inspection and testing will be performed under provisions of Architectural Specification Sections.
- B. Test refrigeration system in accordance with ASME B31.5.
- C. Pressure test system with dry nitrogen to 200 psig. Perform final tests at 27 inches vacuum and 200 psig using electronic leak detector. Test to no leakage.

**END OF SECTION 232300**



**SECTION 233100**  
**HVAC DUCTS AND CASING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Materials
- B. Ductwork fabrication
- C. Manufactured ductwork and fittings
- D. Exposed spiral ductwork

**1.02 RELATED SECTIONS**

- A. Specification Section 23 0593 - Testing, Adjusting, and Balancing for HVAC
- B. Specification Section 23 0713 - Duct Insulation.
- C. Specification Section 23 3300 - Air Duct Accessories.
- D. Specification Section 23 3700 - Air Outlets and Inlets.

**1.03 REFERENCES**

- A. ASTM A 36 - Structural Steel
- B. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles
- C. ASTM A 525 - General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
- D. ASTM A 527 - Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality
- E. AWS D9.1 - Welding of Sheet Metal
- F. NBS PS 15 - Voluntary Product Standard for Custom Contact-Molded Reinforced-Polyester Chemical Resistant Process Equipment
- G. NFPA 90A - Installation of Air Conditioning and Ventilating Systems
- H. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems
- I. SMACNA - HVAC Air Duct Leakage Test Manual
- J. SMACNA - HVAC Duct Construction Standards - Metal and Flexible
- K. UL 181 - Factory-Made Air Ducts and Connectors

**1.04 PERFORMANCE REQUIREMENTS**

- A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

**1.05 SUBMITTALS**

- A. Shop Drawings: Indicate duct fittings, particulars such as gauges, sizes, welds, and configuration prior to start of work for four inch (4") pressure class and higher and kitchen hood exhaust systems.
- B. Product Data: Provide data for duct materials, duct liner, and duct connectors.

**1.06 PROJECT RECORD DOCUMENTS**

- A. Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

**1.07 QUALITY ASSURANCE**

- A. Perform work in accordance with SMACNA - HVAC Duct Construction Standards - Metal and Flexible.



- B. Maintain one copy of document on site.

#### **1.08 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three-years experience.
- B. Installer: Company specializing in performing the work of this section with minimum three-years experience.

#### **1.09 REGULATORY REQUIREMENTS**

- A. Construct ductwork to NFPA 90A Standards.

#### **1.10 ENVIRONMENTAL REQUIREMENTS**

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures during and after installation of duct sealants.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. Galvanized Steel Ducts: ASTM A924 and ASTM A653 galvanized steel sheet, lock-forming quality, having G60 zinc coating of in conformance with ASTM A90.
- B. Insulated Flexible Duct
  1. Manufacturers:
    - a. Thermaflex G-KM
    - b. Flexmaster
    - c. Atco
    - d. Engineer approved equal.
  2. UL 181, Class 1, NFPA 90A and 90B compliant, interlocking spiral of steel wire, fiberglass insulation with R value of 4.2 or greater; core shall be chlorinated polyethylene vapor barrier film. (Polyester is not acceptable). Outer shell/vapor barrier shall be metalized polyester or polyethylene film.
  3. Pressure Rating: Six inch (6") positive and one inch (1") negative.
  4. Maximum Velocity: 5000 fpm.
  5. Temperature Range: -20 to 180 deg F.
  6. Vapor Transmission: 0.1 perms or less (ASTM E96)
  7. Flex Elbows: Flex duct 90 degree elbow splines for connections to diffusers. Flex elbows shall prevent kinks in flex duct. Elbow spline shall be UL-2043 listed for use in plenums.
- C. Fasteners: Rivets, bolts or sheet metal screws.
- D. Duct Sealant
  1. Manufacturers:
    - a. Design Polymeric (DP1010)
    - b. Ductmate
    - c. Durodyne
    - d. Engineer approved equal.
  2. Description: Water based, non hardening, high velocity/high pressure duct sealant intended for indoor and outdoor HVAC ducts.
  3. Pressure Rating: 10" water column minimum.
  4. Service Temperature: -20 to 200F
  5. Listings
    - a. ASTM E-84/UL723 Flame/Smoke Spread: 25/50 or less.
    - b. UL-181B listed for use on Flex Duct connections.
    - c. Conforms to NFPA 90A & 90B requirements.
    - d. Approved for use on interior of ducts.

- 6. VOC Content
  - a. 0 g/L
  - b. CDPH Standard Method v1.1 (14 days): Less than 5.0 mg/m<sup>3</sup>.
- E. Hanger Rod: ASTM A36; steel, galvanized; threaded both ends, threaded one end.

## **2.02 DUCTWORK FABRICATION**

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gauges, reinforcing and sealing for operating pressures indicated.
- B. Increase duct sizes gradually, not exceeding 15 degree divergence wherever possible; maximum 30 degree divergence upstream of equipment and 45 degree convergence downstream.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide airfoil turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with fiberglass insulation.
- D. Fabricate continuously welded round and oval duct fittings two gauges heavier than duct gauges indicated in SMACNA Standard. Joints shall be minimum four inch (4") cemented slip joint, brazed or electric welded. Prime coat welded joints.
- E. Provide standard 45 degree lateral wye takeoffs or 90 degree conical tee takeoffs.
- F. Fabricate all exposed ductwork using paint grip galvanized sheet metal.
- G. All outside air intake or relief ductwork above finished areas shall be caulked to be watertight. An auxiliary continuous drain pan shall be provided beneath these ducts to prevent damage in case of a waterproofing failure. Line this drain pan with 1/2 inch duct liner and turn up all edges.
- H. All joints in rectangular, round or oval ductwork that exceed 100 inches in perimeter length shall be made with Ductmate, TDC, or TDF connections.

## **2.03 MANUFACTURED DUCTWORK AND FITTINGS**

- A. Manufacture in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and as indicated. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.
- B. Round Ducts: Machine made from round spiral lock seam duct with light reinforcing corrugations, fittings manufactured at least two gauges heavier metal than duct.

## **2.04 EXPOSED SPIRAL DUCTWORK**

- A. Galvanized spiral duct construction and gauge shall be in accordance with SMACNA HVAC Duct Construction Standards.
- B. Fittings: All fittings shall be self-sealing, double lipped, gasket type fittings with EPDM rubber gasket. No external sealant or tape is allowed. Fittings shall be galvanized steel constructed in accordance with ASTM A653 and A924.
- C. Elbows: Elbows shall be gored elbows. 45° elbows shall be 3-piece elbows and 90° elbows shall be 5-piece elbows.
- D. Taps: System shall utilize high efficiency shoe type saddle taps.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

- C. All ductwork shall be sealed to provide a SMACNA Seal Class A installation for all longitudinal seams, all transverse seams and all duct penetrations. Flame spread rating shall not exceed 25 and smoke developed shall not exceed 50 when tested in compliance with ASTM-E-84-87.
- D. Sealant shall be non-hardening and water resistant. Sealant shall be capable of being applied with a brush and shall be applied in accordance with manufacturer's instructions. Each seam or penetration shall be dressed after application of sealant for neat appearance.
- E. Ductwork shall be installed following essentially lines indicated on the drawings. Install offsets, and angles. Transitions may be required to avoid interference with other work and existing conditions. Maintain full capacity of ductwork.
- F. Flex Duct Installation:
  - 1. Maximum length of flex duct: 5ft
  - 2. Provide 90 deg elbow splines to prevent flex duct kinking, especially when connecting to ceiling diffusers
  - 3. Connections to rigid ducts and fittings: Peel back insulation and place flexible inner core over fitting and seal with two layers of duct tape (minimum 2" overlap on fitting and flex duct core). Install clamps over the top of the duct tape. Stretch insulation back over fitting and wrap with two layers of duct tape. Duct Sealant/Mastic may be substituted for the tape that seals the inner core to the fitting. Refer to manufacturer's instructions. Duct tape, mastic/sealant and clamps shall be UL181 listed.
- G. Duct sizes are net outside dimensions. Maintain outside sizes for lined ducts. Do not increase duct dimensions.
- H. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- I. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- J. Use crimp joints with or without bead for joining round duct sizes eight inch (8") and smaller with crimp in direction of airflow.
- K. Use double nuts and lock washers on threaded rod supports.
- L. Connect diffusers to low pressure ducts directly or with five foot (5') maximum length of flexible duct held in place with strap or clamp.
- M. Connect flexible ducts to metal ducts with draw bands.
- N. Set plenum doors six inch (6") to 12 inches above floor. Arrange door swing so that fan static pressure holds door in closed position.
- O. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

**3.02 SCHEDULES**

**DUCTWORK MATERIAL**

<b>AIR SYSTEM</b>	<b>MATERIAL</b>
Low Pressure Supply	Galvanized Steel
Return and Relief	Galvanized Steel
General Exhaust	Galvanized Steel
Outside Air Intake	Galvanized Steel

Clinton County Conservation  
Office Renovation  
Grand Mound, Iowa

**DUCTWORK PRESSURE CLASS**

<b>AIR SYSTEM</b>	<b>PRESSURE CLASS</b>
Supply	1"
Return and Relief	1"
General Exhaust	1"
Outside Air Intake	1"

**END OF SECTION 233100**



**SECTION 233300**  
**AIR DUCT ACCESSORIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Air turning devices/extractors
- B. Duct access doors
- C. Duct test holes
- D. Flexible duct connections
- E. Manual Balancing Damper
- F. Ductwork flow sensors

**1.02 RELATED SECTIONS**

- A. Specification Section 23 3100 - HVAC Ducts and Casings.

**1.03 REFERENCES**

- A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems
- B. NFPA 92A - Smoke Control Systems
- C. NFPA 70 - National Electrical Code
- D. SMACNA - HVAC Duct Construction Standards - Metal and Flexible
- E. UL 33 - Heat Responsive Links for Fire-Protection Service
- F. UL 555 - Fire Dampers and Ceiling Dampers
- G. UL 555S - Leakage Rated Dampers for use in Smoke Control Systems

**1.04 SUBMITTALS**

- A. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers and all accessories.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers, duct access doors, and fire and smoke dampers. Include electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate for combination fire and smoke dampers.

**1.05 PROJECT RECORD DOCUMENTS**

- A. Record actual locations of access doors or test holes.

**1.06 QUALIFICATIONS**

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

**1.07 REGULATORY REQUIREMENTS**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories Inc., as suitable for the purpose specified and indicated.

**1.08 DELIVERY, STORAGE AND HANDLING**

- A. Deliver, store, protect and handle products to site under provisions of Architectural Specification Sections.
- B. Protect dampers from damage to operating linkages and blades.

## **PART 2 PRODUCTS**

### **2.01 AIR TURNING DEVICES/EXTRACTORS**

- A. Multi-blade device with radius blades attached to pivoting frame and bracket, steel construction with push-pull operator strap.

### **2.02 DUCT ACCESS DOORS**

- A. Manufacturers:
  - 1. Ruskin
  - 2. Nailor
  - 3. Engineer approved equal.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Fabrication: Rigid and close fitting of galvanized steel with sealing gaskets and quick fastening locking devices. Install minimum one inch (1") thick insulation with sheet metal cover for insulated ductwork.
  - 1. Less Than 12 Inch Square: Secure with sash locks.
  - 2. Up to 18 inch Square: Provide two hinges and two sash locks.
  - 3. Up to 24 inch x 48 Inches: Three hinges and two compression latches with outside and inside handles.
  - 4. Larger Sizes: Provide an additional hinge.
- D. Access doors with sheet metal screw fasteners are not acceptable.

### **2.03 DUCT TEST HOLES**

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches or neoprene plugs.
- B. Permanent Test Holes: Factory fabricated, airtight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

### **2.04 FLEXIBLE DUCT CONNECTIONS**

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Connector: Fabric crimped into metal edging strip.
- C. Fabric: UL listed fire-retardant neoprene coated woven fiberglass fabric to NFPA 90A, minimum density 30 oz. per sq. yd.
- D. Net Fabric Width: Approximately two inches (2") wide.
- E. Metal: Galvanized 24 gauge steel, three inches (3") wide.
- F. Leaded Vinyl Sheet: Minimum 0.55 inches thick, 0.87 lbs. per sq. ft., 10 dB attenuation in 10 to 10,000 Hz range.

### **2.05 MANUAL BALANCING DAMPER**

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Rectangular Single Blade Dampers: Maximum blade height of 8".
- C. Rectangular Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8" x 72" remove all double spaces in this section. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- D. End Bearings: Except in round ductwork 12 inch and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.
- E. Quadrants:
  - 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.

2. On insulated ducts mount quadrant regulators on standoff mounting brackets, bases or adapters.
3. Where rod lengths exceed 30 inches, provide regulator at both ends.

## **2.06 DUCTWORK FLOW SENSORS (FS)**

- A. Manufacturers:
  1. Titus #EXX
  2. Redi-Flow
  3. Metal Aire
  4. Ruskin
  5. Krueger
  6. Price
  7. Engineer approved equal.
- B. Furnish airflow sensors where indicated.
- C. Sensors shall be pre-installed in a section of round ductwork with total pressure and static pressure pneumatic ports mounted on exterior.
- D. Sensor shall be multi-port, cross or ring pattern.
- E. Combination volume and ductwork flow sensors equal to Ruskin #VFBD35 are acceptable as equal. Provide with submittal.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Verify that electric power is available and of the correct characteristics.

### **3.02 INSTALLATION**

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers at fire dampers, combination fire and smoke dampers and elsewhere as indicated. Review locations prior to fabrication.
- C. Provide duct test holes where indicated and required for testing and balancing purposes.
- D. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment and supported by vibration isolators. Use braided stainless steel flexible connections to equipment located within a one hour rated area.
- E. Provide volume balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum two duct widths from duct take-off. Drawings may not indicate all volume damper locations.
- F. Provide volume balancing dampers on duct take-off to diffusers, grilles and registers, regardless of whether dampers are specified as part of the diffuser, grille or register assembly. Locate as close as possible yet accessible to the main trunk duct. Drawings may not indicate all volume damper locations.
- G. Provide turning vanes in all supply, return and exhaust ductwork unless noted otherwise.
- H. Install ductwork flow sensor in such a way that it is easily accessible for balancing of system. Provide manual volume damper downstream of flow sensors.

**END OF SECTION 233300**





**SECTION 233421**  
**ENERGY RECOVERY VENTILATORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Heat recovery ventilator (Small core, 500 CFM indoor)

**1.02 RELATED SECTIONS**

- A. Specification Section 233100 - HVAC Ducts and Casings.
- B. Specification Section 233300 - Air Duct Accessories.
- C. Specification Section 23 2923 - Variable Frequency Drives

**1.03 SYSTEM DESCRIPTION**

- A. Unit is capable of transferring sensible and latent energy as listed in the equipment schedule.
- B. Unit is designed to be used as a stand-alone energy recovery ventilator or an energy recovery component in a dedicated HVAC system or as a complete ventilation/HVAC unit with the addition of optional heat/cool accessory modules.
- C. Energy recovery wheel to be factory installed in unit.

**1.04 QUALITY ASSURANCE**

- A. Unit shall be constructed in accordance with CSA C22.2 and UL 1995 and shall carry the ETLus and ETLc label of approval.
- B. Insulation shall comply with NFPA 90A requirements for flame spread and smoke generation.
- C. Airflow data shall comply with AMCA 210 method of testing.
- D. All units shall be run tested prior to shipment.

**1.05 DELIVERY, STORAGE HANDLING**

- A. Unit shall be stored and handled per unit manufacturer's recommendations.

**1.06 REFERENCES**

- A. AMCA 99 - Standards Handbook
- B. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes
- C. AMCA 261 - Directory of Products Licensed to Bear the AMCA Certified Ratings Seal
- D. AMCA 300 - Test Code for Sound Rating Air Moving Devices
- E. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices
- F. NEMA MG1 - Motors and Generators
- G. NFPA 96 - Installation of Equipment for the Removal of Smoke and Grease Vapors from Commercial Cooking Equipment
- H. UL 705 - Power Ventilators

**1.07 SUBMITTALS**

- A. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- B. Manufacturer's Instructions: Indicate installation instructions.

**1.08 QUALITY ASSURANCE**

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

### **1.09 REGULATORY REQUIREMENTS**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

### **PART 2 PRODUCTS**

#### **2.01 HEAT RECOVERY VENTILATOR (SMALL CORE, 500 CFM INDOOR)**

- A. Manufacturers:
  - 1. Greenheck
  - 2. Renewaire
  - 3. Soler and Palau
  - 4. Engineer approved equal.
- B. Energy Recovery Cell (ERC): The air-to-air energy recovery unit shall be supplied with a flow Energy Recovery Cell that has a continuous formed transfer surface made from aluminum. The ERC shall withstand ten inch (10") of differential pressure. All efficiencies are derived from the ASHRAE-84 1991 Standard.
- C. Unit Structure: The cabinet shall be made from 20 gauge galvanized steel. All joints and penetrations shall be sealed. The inner walls, floor and ceiling shall be insulated with one inch of 3 lb. density fiberglass insulation with an aluminum foil outer vapor seal. The unit has sealed condensate pans with 1/2 inch female pipe thread drain connections through the side of the unit to be field piped by the installer.
- D. Electrical: All electrical components are UL listed. The wiring is performed according to NEC, UL and ETL standards. The complete assembly is ETL listed. The unit shall be wired for a single point 115 VAC field electrical connections.
- E. Blowers: The supply and exhaust blowers shall be double width, double inlet, forward curved, multi-speed direct drive centrifugal blowers with ODP motors. The blower/motor assemblies are isolated from the unit with flexible canvas duct connections and mounted on RIS isolators.
- F. Air Filters: The supply air shall be filtered with two inch 30% pleated filters. The filters shall be held in place with a slide rack for ease in changing filters. Dual filters required.
- G. Defrost control shall be accomplished by opening the circuit to the supply blower momentarily, preventing any frosting of the cell.
- H. Options: Dual filters multi-speed switch.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof or wall exhausters with cadmium plated steel lag screws to roof curb or structure.
- C. Extend ducts to roof or wall exhausters into roof curb or structure. Counterflash duct to roof or wall opening.
- D. Provide sheaves required for final air balance.
- E. Install backdraft dampers on inlet to roof and wall exhausters.
- F. Do not operate fans until ductwork is clean, filters are in place, and bearings are lubricated.
- G. If equipment is to be operated prior to building turn over to the owner, the mechanical contractor must install filter media on all return and exhaust grilles.
- H. Install motorized control dampers on the intake and exhaust ducts serving the energy recovery ventilator.

#### **3.02 SCHEDULES**

- A. See drawings.

**END OF SECTION 233421**

**SECTION 233700**  
**AIR OUTLETS AND INLETS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Diffusers/registers/grilles
- B. Louvers

**1.02 REFERENCES**

- A. ADC 1062 - Certification, Rating and Test Manual
- B. AMCA 500 - Test Method for Louvers, Dampers and Shutters
- C. ARI 650 - Air Outlets and Inlets
- D. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets
- E. SMACNA - HVAC Duct Construction Standard - Metal and Flexible
- F. NFPA 70 - National Electrical Code
- G. NFPA 90A - Installation of Air Conditioning and Ventilating Systems

**1.03 SUBMITTALS**

- A. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Review ceiling type and style before submitting. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

**1.04 PROJECT RECORD DOCUMENTS**

- A. Record actual locations of air outlets and inlets.

**1.05 QUALITY ASSURANCE**

- A. Test and rate air outlet and inlet performance in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.
- B. Test and rate louver performance in accordance with AMCA 500.

**1.06 QUALIFICATIONS**

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

**PART 2 PRODUCTS**

**2.01 DIFFUSERS/REGISTERS/GRILLES**

- A. Manufacturers:
  - 1. Titus
  - 2. Carnes
  - 3. Tuttle & Bailey
  - 4. Price Ind.
  - 5. Krueger
  - 6. Nailor
  - 7. Engineer approved equal.
- B. Refer to schedule on drawings for style, size, and finish.

**2.02 LOUVERS**

- A. Manufacturers:
  - 1. Ruskin
  - 2. American Warming
  - 3. Louvers and Dampers, Inc.

4. Pottorff
  5. Greenheck
  6. United Enertech
  7. Air Balance
  8. Engineer approved equal.
- B. Type: Drainable blades on 37-1/2 degree slope, heavy channel frame bird screen with 1/2 inch square mesh for exhaust and 3/4 inch for intake. (See drawings).
  - C. Fabrication: Extruded aluminum, 0.080 inch thick welded assembly with factory anodized finish. Color to be selected by architect. Architect has authority to select multiple colors.
  - D. Mounting: Furnish with exterior flat flange for installation. Verify with architect prior to ordering.
  - E. Interior louvers shall be constructed of 0.125 inch thickness with welded construction.
  - F. Refer to drawings for louver dimensions.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position and type to conform to architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with airtight connection.
- D. Provide balancing dampers on duct take-off to diffusers, grilles and registers, despite whether dampers are specified as part of the diffuser or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black.
- F. Provide a cable operated damper or access panel where a balancing damper is located above gypsum ceilings or in an inaccessible location. Externally cable operated damper shall be similar to Ruskin ZCDR25.

#### **3.02 SCHEDULES**

- A. See drawings.

**END OF SECTION 233700**

**SECTION 235100**  
**BREECHINGS, CHIMNEYS AND STACKS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Category IV positive pressure vent pipe

**1.02 REFERENCES**

- A. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
- B. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements
- C. ASTM A527 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality
- D. ASTM A569 - Steel, Sheet and Strip, Carbon (0.15 Maximum Percent) Hot-Rolled Commercial Quality
- E. NFPA 54 (ANSI Z223.1) - The National Fuel Gas Code
- F. NFPA 70 - National Electrical Code
- G. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances
- H. SMACNA - HVAC Duct Construction Standards - Metal and Flexible
- I. UL 103 - Standard for Factory Built Low Heat Chimneys
- J. UL 378 - Standard for Draft Equipment
- K. UL 441 - Standard for Gas Vents
- L. UL 641 - Standard for Low Temperature Venting Systems
- M. UL 959 (ANSI Z181.1) - Medium Heat Appliance Factory Built Chimneys

**1.03 DEFINITIONS**

- A. Breeching: Vent Connector.
- B. Chimney: Primarily a vertical shaft enclosing at least one vent for conducting flue gases outdoors.
- C. Smoke Pipe: Round, single wall vent connector.
- D. Vent: That portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used.
- E. Vent Connector: That part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device.

**1.04 DESIGN REQUIREMENTS**

- A. Factory built vents and chimneys used for venting natural draft appliances shall comply with NFPA 211 and be UL listed and labeled.

**1.05 SUBMITTALS**

- A. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breechings. Submit layout drawings indicating view and elevations.
- B. Product Data: Provide data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.

**1.06 REGULATORY REQUIREMENTS**

- A. Conform to applicable codes for installation of gas and oil burning appliances and equipment.

- B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

## **PART 2 PRODUCTS**

### **2.01 CATEGORY IV POSITIVE PRESSURE VENT PIPE FOR CONDENSING APPLIANCES**

- A. For flue pipes 6" and smaller (Polypropylene)
  - 1. Manufacturers
    - a. Centrotherm "Innoflue"
    - b. Duravent PolyPro
    - c. Z-Flex Z-Dens
    - d. Polyflue
    - e. Engineer approved equal
  - 2. General: Category IV positive pressure Polypropylene vent piping for use with condensing appliances. Clearance to combustibles shall be zero (0") inches for flue temperatures below 194 deg F.
  - 3. Listings: UL C-S636. Appliance manufacturer shall approve polypropylene pipe as an acceptable venting material.
  - 4. Pipe Material: Rigid Polypropylene capable of withstanding 230 deg F continuous temperature. Piping located on the exterior of the building or exposed to sunlight shall be UV stabilized. Flexible piping is not acceptable.
  - 5. Joints and Gaskets: EPDM flexible gaskets and locking bands provided by the pipe manufacturer. Pressure rating of 20" W.C. Joining system shall not require primer or glue.
  - 6. Terminations: UV stabilized terminations shall be a 90 deg elbow down or a tee fitting. All terminations shall be approved by the appliance manufacturer. Roof termination shall be provided with the pipe manufacturer's roof flashing (flat and sloped roofs). Concentric terminations shall only be used if allowed by the appliance manufacturer. All terminations shall have a bird screen.
  - 7. Condensate fittings: Provide manufacturer's condensate collection fittings at all low points in the flue pipe system. Route drainage fittings to a floor drain.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with applicable codes.
- C. Support breechings from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support vertical breechings, chimneys and stacks at twelve foot spacing, to adjacent structural surfaces or at floor penetrations.
- D. Refer to SMACNA HVAC Duct Construction Standards - Metal and Flexible for equivalent duct support configuration and size.
- E. Install concrete inserts for support of breechings, chimneys, and stacks in coordination with formwork.
- F. Coordinate installation of dampers and induced draft fans.
- G. Maintain UL listed minimum clearances from combustibles for type #B double wall gas vents. Assemble pipe and accessories as required for complete installation.
- H. Install vent dampers, locating close to draft hood collar and secured to breeching.
- I. Assemble and install stack sections in accordance with NFPA 82, industry practices and in compliance with UL listing. Join sections with acid-resistant joint cement to ASTM C105. Connect base section to foundation using anchor lugs.
- J. Level and plumb chimney and stacks.
- K. Clean breechings, chimneys, and stacks during installation removing dust and debris.

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- L. Provide slip joints permitting removal of appliances without removal or dismantling of breechings, breeching insulation, chimneys, or stacks.
- M. Provide minimum length of breeching to connect appliance to chimney. Provide type "B" chimney continuously from appliances.

**3.02 SCHEDULES**

- A. See drawings for information on BTU input to stack and required elevations.

**END OF SECTION 235100**





**SECTION 235400**  
**FURNACES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Furnaces
- B. Evaporator coil units
- C. Condensing units
- D. Thermostats

**1.02 RELATED SECTIONS**

- A. Specification Section 23 0553 – Identification for HVAC Piping and Equipment
- B. Specification Section 230713 - Duct Insulation
- C. Specification Section 23 1123 – Natural Gas and Propane Piping
- D. Specification Section 23 2300 – Refrigerant Piping and Specialties

**1.03 REFERENCES**

- A. ANSI/AHRI 210/240 - Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment
- B. ANSI/AHRI 270 - Sound Rating of Outdoor Unitary Equipment
- C. ANSI/AHRI 520 – Performance Rating of Positive Displacement Condensing Units
- D. ASHRAE 23 – Methods of Testing for Rating the Performance of Positive Displacement Refrigerant Compressors and Condensing Units That Operate at Subcritical Temperatures
- E. ASHRAE 15 - Safety Code for Mechanical Refrigeration
- F. ASHRAE 52 - Method of Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter
- G. ASHRAE 90 - Energy Conservation in New Building Design
- H. ASHRAE 103 - Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers
- I. NFPA 54 (AGA Z223.1) - National Fuel Gas Code
- J. NFPA 90A - Installation of Air Conditioning and Ventilating Systems
- K. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems
- L. NFPA 211 - Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances
- M. UL 207 - Refrigerant-Containing Components and Accessories, Non-Electrical

**1.04 SUBMITTALS**

- A. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data and wiring diagrams and unit supports.
- B. Shop Drawings: Indicate assembly, required clearances, location and size of field connections.
- C. Design Data: Indicate refrigerant pipe sizing and routing.
- D. Manufacturer's Instructions: Indicate rigging, assembly and installation instructions.
- E. Project Record Documents: Record actual locations of components and connections.
- F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating installation instructions, maintenance and repair data, and parts listing.
- G. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in owner's name and registered with manufacturer.

### **1.05 REGULATORY REQUIREMENTS**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

### **1.06 WARRANTY**

- A. Comprehensive parts and labor warranty for furnace, condensing unit and thermostat for 12 months after start of beneficial use by owner or 18 months after date of shipment from factory, whichever is sooner.
- B. Parts warranty for compressor from end of comprehensive warranty until four years later.
- C. Parts warranty for heat exchanger from end of comprehensive warranty until nine years later.
- D. Warranties must not be pro-rated.

## **PART 2 PRODUCTS**

### **2.01 FURNACES (GAS FIRED)**

- A. Manufacturer:
  - 1. Lennox
  - 2. Carrier
  - 3. Trane
  - 4. Heil
  - 5. York
  - 6. Daikin
  - 7. Goodman
  - 8. Engineer approved equal.
- B. Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, natural gas heating section, controls, and accessories; wired for single power connection with control transformer.
- C. Airflow Configuration: See schedule on drawings.
- D. Heating: Two stage natural gas fired.
- E. Electric Refrigeration: Refrigerant cooling coil and outdoor package containing compressor, condenser coil and condenser fan.
- F. Accessories: See schedule on drawings.
- G. Provide with factory external filter cabinet with four inch (4") thick MERV 13 filter.
- H. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, fiberglass insulation with reflective liner.
- I. Supply Fan: Centrifugal type rubber mounted.
- J. Motor: Multiple speed, permanently lubricated.
- K. Heat Exchanger: Aluminized steel welded construction with aluminum finned stainless steel tube condensing coil.
- L. Gas Burner:
  - 1. Sealed combustion with blower.
  - 2. Gas valve provides 100% safety gas shut-off; 24 volt combining pressure regulation, safety pilot, pilot filtration, and automatic electric valve.
  - 3. Electronic pilot ignition with electric spark igniter.
  - 4. Non-corrosive combustion air blower with permanently lubricated motor.
- M. Gas Burner Safety Controls:
  - 1. Thermocouple Sensor: Prevents opening of gas valve until pilot flame is proven and stops gas flow on ignition failure.

2. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.
- N. Operating Controls:
1. Room Thermostat: Cycles burner to maintain room temperature setting.
  2. Supply Fan Control: Energize from bonnet temperature independent of burner controls with adjustable timed off delay and fixed timed on delay with manual switch for continuous fan operation.
- O. Performance:
1. Ratings: Energy Efficiency Rating (EER) not less than requirements of ASHRAE 90A; seasonal efficiency to ASHRAE 103.
  2. Refer to Furnace Schedule. Gas heating capacities are sea level ratings.

## **2.02 EVAPORATOR COIL UNITS**

- A. Manufacturers:
1. Match furnace manufacturer.
- B. Construction and Ratings: In accordance with ANSI/ARI 210/240 and UL 207.
- C. Evaporator Coil: Copper tube aluminum fin assembly, galvanized drain pan, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve, steel cabinet with baked enamel finish and insulation.
- D. Cooling Capacity: See schedule on drawings.

## **2.03 CONDENSING UNITS**

- A. Manufacturer:
1. Match furnace manufacturer.
- B. Construction and Ratings: In accordance with ANSI/AHRI 210/240, and UL 207. Testing: ASHRAE 14.
- C. Compressor: ANSI/AHRI 520; Scroll; hermetic, resiliently mounted integral with condenser with positive lubrication, crankcase heater, high pressure control, motor overload protection, service valves and drier. Provide time delay control to prevent short cycling.
- D. Refrigeration Accessories: Filter drier, high pressure switch, low pressure switch, service valves and gauge ports, and thermometer well. Provide refrigerant lines, factory cleaned, dried, pressurized and sealed with insulated suction line.
- E. Air Cooled Condenser: ANSI/AHRI 520; aluminum fin and copper tube coil with direct drive axial propeller fan resiliently mounted, and galvanized fan guard. See capacity schedule on the drawings.
- F. Electrical Characteristics: See schedule on the drawings.
- G. Disconnect Switch: Field mounted disconnect by electrical contractor.
- H. Refrigeration Operating Controls:
1. Room Thermostat: Cycles condensing unit and supply fan to maintain room temperature setting.

## **2.04 THERMOSTATS**

- A. Manufacturer:
1. Honeywell Vision Pro 8000
  2. Lennox Comfortsense
  3. White-Rodgers
  4. Engineer approved equal.
- B. Electric Solid State Micro-Computer Based Room Thermostat:
1. Minimum of two stages of [gas heat and two stages of cooling.
  2. Touch screen.

3. Preferential rate control to minimize overshoot and deviation from setpoint.
4. Set-up for four separate temperatures per day.
5. Instant override of setpoint for continuous or timed period from one hour to 31 days.
6. Short cycle protection.
7. Programming based on every day of the week.
8. Selection features including degree F or degree C display, 12 or 24 hour clock, keyboard disable, and fan on-auto.
9. Battery replacement without program loss.
10. Keypad lockout.
11. Early startup capabilities to reach setpoint at desired time of day.
12. Thermostat Display:
  - a. Time of day.
  - b. Actual room temperature.
  - c. Programmed temperature.
  - d. Programmed time.
  - e. Duration of timed over ride.
  - f. Day of week.
  - g. System Mode Indication: Heating, cooling, auto, off, fan auto, fan on.
    - 1) If schedule is in occupied the fan shall run. Cycle heating or cooling with demand.
    - 2) Remind user to replace filter after 90 fan run days.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that the floors are ready for installation of units and openings are as indicated on the shop drawings.
- B. Verify proper power supply is available for furnace and condenser package.
- C. Verify proper fuel supply is available for connection.

#### **3.02 INSTALLATION**

- A. Install in accordance with NFPA 90A and NFPA 90B.
- B. Install gas fired furnaces in accordance with ANSI Z223.1 NFPA 54.
- C. Provide vent connections in accordance with NFPA 211.
- D. Install refrigeration systems in accordance with ASHRAE 15.
- E. Mount air-cooled condensing unit on four-inch concrete pad on grade or on rooftop supports. See drawings for location.
- F. This contractor is responsible for all control wiring.
- G. Provide a one-hour enclosure around PVC intake and vent piping located in a ceiling return air plenum.
- H. Insulate vent and intake piping in attic space in accordance to manufacturer's recommendations.
- I. All thermostats shall be installed per all applicable ADA Codes and Guidelines.
- J. Pipe drain from cooling coils and humidifiers to nearest floor drain. Install per manufacturer's instructions.
- K. Refrigerant piping shall be sized and installed per manufacturer requirements. Provide necessary accessories for long-line application as required.

**END OF SECTION 235400**

**SECTION 238101**

**TERMINAL HEAT TRANSFER, CONVECTION HEATING, AND COOLING UNITS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electric wall heaters
- B. Electric unit heaters

**1.02 REFERENCES**

- A. NFPA 70 - National Electrical Code
- B. UL 303 - Refrigeration and Air-Conditioning Condensing and Compressor Units

**1.03 SUBMITTALS**

- A. Product Data: Provide typical catalog of information including arrangements.
- B. Shop Drawings:
  - 1. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
  - 2. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers and comparison of specified heat required to actual heat output provided.
  - 3. Indicate mechanical and electrical service locations and requirements.
- C. Manufacturer's Instructions: Indicate installation instructions and recommendations.
- D. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access or valve.
- E. Operation and Maintenance Data: Include manufacturers descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been completed in owner's name and registered with manufacturer.

**1.04 QUALITY ASSURANCE**

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

**1.05 REGULATORY REQUIREMENTS**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

**1.06 WARRANTY**

- A. Provide one-year manufacturer's warranty for condensing units and compressors.

**PART 2 PRODUCTS**

**2.01 ELECTRIC WALL HEATERS**

- A. Manufacturers:
  - 1. Berko
  - 2. Heatrex
  - 3. Indeeco
  - 4. Markel
  - 5. Raywall
  - 6. Engineer approved equal.
- B. Coils: Industrial grade steel finned tubular elements.
- C. Cabinet: 18 gauge steel housing (4-1/2" deep) with Extruded aluminum heavy duty architectural grille. Provide surface, recessed, or semi-recessed mount kit. Confirm mounting type with the design team.

- D. Finish: Polyester powder paint finish. Architect shall select color from standard color chart.
- E. Fans: Propeller fan, statically and dynamically balanced, direct driven, permanently lubricated bearings.
- F. Motor: Permanently lubricated, totally enclosed motor.
- G. Control: Integral thermostat with Fan On/Auto switch.
- H. Electrical: Integral disconnect switch.
- I. Submit color chart for architectural approval.

## **2.02 ELECTRIC UNIT HEATERS**

- A. Manufacturers:
  - 1. Berko
  - 2. Heatrex
  - 3. Indeeco
  - 4. Markel
  - 5. QMark
  - 6. Raywall
  - 7. Engineer approved equal.
- B. Heating Elements: Industrial grade stainless steel tubular elements in 2-10 KW units and steel finned tubular elements in 15-60 KW units.
- C. Cabinet: 18 gauge galvanized steel with polyester powder coat finish. Color as selected by the architect.
- D. Outlet Grille: Adjustable louvers with protective mesh screen.
- E. Fan: Direct drive propeller type statically and dynamically balanced with permanently lubricated bearings.
- F. Motor: Blow through, totally enclosed, thermally protected motor.
- G. Mounting: Factory assembled wall or ceiling hanger.
- H. Control: Provided with wall mounted thermostat.
- I. Electrical: Manufacturer's integral disconnect switch.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install equipment exposed to finished areas after walls and ceilings are finished and painted. Avoid damage.
- C. Protection: Provide finished cabinet units with protective covers during balance of construction.
- D. Unit Heaters: Hang from building structure with pipe hangers anchored to building, not from piping. Mount as high as possible to maintain greatest headroom unless otherwise indicated.
- E. Cabinet Unit Heaters: Install as indicated. Coordinate to assure correct recess size for recessed units.
- F. Install electric heating equipment, including devices furnished by the manufacturer, but not factory mounted. Furnish copy of manufacturer's wiring diagram submittal. Install electrical wiring in accordance with manufacturer's submittals.

### **3.02 CLEANING**

- A. After construction is completed, including painting, clean exposed surfaces of all units. Vacuum clean the coils and inside of the cabinets.
- B. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.

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C. Install new filters.

**3.03 SCHEDULES**

A. See drawings.

**END OF SECTION 238101**





**SECTION 238126**  
**DUCTLESS SPLIT SYSTEM UNITS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Single zone unit

**1.02 RELATED SECTIONS**

- A. Specification Section 23 2300 - Refrigerant Piping

**1.03 REFERENCES**

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment
- B. AHRI 270 - Standard for Sound Performance Rating of Outdoor Unitary Equipment
- C. AHRI 365 - Standard for Performance Rating of Commercial and Industrial Unitary Air-Conditioning Condensing Units
- D. ASHRAE 15 - Safety Standard for Refrigeration Systems
- E. ASHRAE 90.1 - Energy Standard for Buildings except Low-Rise Residential Buildings
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)
- G. NEMA MG 1 - Motors and Generators
- H. NFPA 70 - National Electrical Code
- I. UL 207 - Refrigerant-Containing Components and Accessories, Non-Electrical
- J. UL 1995 - Heating and Cooling Equipment

**1.04 SUBMITTALS**

- A. Product Data: Provide typical catalog of information including rated capacities, furnished specialties, accessories, and arrangements.
- B. Shop Drawings:
  - 1. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
  - 2. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, and comparison of specified heat required to actual heat output provided.
  - 3. Indicate mechanical and electrical service locations and requirements.
- C. Manufacturer's Instructions: Indicate installation instructions and recommendations.
- D. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access or valve.
- E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been completed in owner's name and registered with manufacturer.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA70, Article100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Energy-Efficiency Ratio and Coefficient of Performance: Equal to or greater than prescribed by ASHRAE90.1.

- D. The system components must be tested in accordance with the AHRI standard that applies to the particular component. All outside unit sound data presented must be determined using AHRI 270 methods.

#### **1.06 REGULATORY REQUIREMENTS**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc. or ETL, as suitable for the purpose specified and indicated.

#### **1.07 WARRANTY**

- A. Provide five-year manufacturer's parts and defects warranty from time of installation.

### **PART 2 PRODUCTS**

#### **2.01 SINGLE ZONE SYSTEM**

- A. Manufacturers
  1. Daikin
  2. Fujitsu
  3. Friedrich
  4. LG
  5. Mitsubishi
  6. Panasonic
  7. Samsung
  8. Engineer approved equal.
- B. Summary: Heat Pump split-system air conditioning consisting of separate evaporator-fan and compressor-condenser components. Units shall be a variable capacity, single zone system.
- C. Indoor Units: Self contained fully factory assembled, wired and run tested prior to shipment. Contained within the indoor unit shall be all factory wiring, piping, control circuit board, fan, and fan motor. The unit shall have a self-diagnostic function, 3-minute restart time delay mechanism, an auto restart function, an emergency / test operation. Indoor unit shall be charged with dry air before shipment from factory.
  1. Cabinet:
    - a. The cassette cabinet shall be of galvanized steel construction with high density foam insulation.
    - b. The cassette face shall have a white finish.
    - c. The cassette shall be capable of four direction adjustable air discharge.
    - d. The cassette cabinet shall have a have knock-out provisions for a ventilation air intake connection.
  2. Fan:
    - a. The indoor unit fan shall be an assembly with a direct driven fan powered by a single motor.
    - b. The fan shall be statically and dynamically balanced with permanently lubricated bearings.
    - c. The indoor fan shall have no less than three fan speeds.
  3. Filter:
    - a. Return air shall be filtered by means of an easily removed, washable, mold resistant filter.
  4. Coil:
    - a. The indoor unit coil shall be of nonferrous construction with smooth plate fins on copper tubing.
    - b. All tube joints shall have corrosion resistant alloy brazing.
    - c. The coils shall be pressure tested at the factory.
    - d. A sloped, corrosion resistant condensate pan with drain shall be provided under the coil.

- e. Provide a condensate pump with 20" of lift for discharge of condensate from drain pan.
- f. The condensate pump shall be mounted within the indoor unit casing.
- 5. Electrical:
  - a. The indoor unit shall be powered and controlled directly from the outdoor unit providing both primary power and integrated, bi-directional, digital control signal.
  - b. Indoor unit shall have a wall mounted and hard wired thermostat as shown on the drawings.
- D. Outdoor Units:
  - 1. General: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, with compressor and condenser.
  - 2. Unit Cabinet:
    - a. The casing shall be fabricated of galvanized steel with powder coating for corrosion protection. Assembly hardware shall be cadmium plated or stainless steel.
    - b. Mounting feet, traverse mounted across the cabinet base pan, welded mount.
  - 3. Fan:
    - a. The unit shall be furnished with a direct drive, propeller type fan.
    - b. The condenser fan motor shall be a variable speed, direct current (DC) motor and shall have permanently lubricated bearings.
    - c. The fan motor shall be mounted with vibration isolation for quiet operation.
    - d. The fan shall be provided with a guard to prevent contact with moving parts.
  - 4. Coil:
    - a. The outdoor unit coil shall be copper with aluminum fins.
    - b. The coil shall be protected with an integral guard.
    - c. Refrigerant flow from the outdoor unit to the indoor units shall be independently controlled by means of an electronic linear expansion valve.
    - d. Outdoor unit shall be pre-charged with sufficient R-410a to run the system.
    - e. All refrigerant piping between the outdoor and indoor units shall be sized per the manufacturer's recommendations.
  - 5. Compressor:
    - a. The compressor shall be a high performance, hermetic, inverter driven, variable speed, dual rotary type.
    - b. The compressor motor shall be direct current (DC) type equipped with a factory supplied and installed inverter drive package.
    - c. The outdoor unit shall be equipped with a suction side refrigerant accumulator.
    - d. The compressor will be equipped with an internal thermal overload.
    - e. The compressor shall be mounted to avoid the transmission of vibration.
    - f. The compressor shall have a low ambient kit to allow cooling down to 0 deg F.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install equipment exposed to finished areas after walls and ceilings are finished and painted. Avoid damage.
- C. Protection: Provide finished cabinet units with protective covers during balance of construction.
- D. Install refrigeration systems in accordance with ASHRAE 15.
- E. Mount air-cooled outdoor condensing unit on rooftop supports or ground mounted stand. Refer to manufacturer's instructions for minimum height. See drawings on location.
- F. Mechanical contractor shall run control wiring from outdoor unit to each indoor unit. Install wired thermostat as shown on the drawings.

**3.02 CLEANING**

- A. After construction is completed, including painting, clean exposed surfaces of all units. Vacuum clean the coils and inside of the cabinets.
- B. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.
- C. Install new filters.

**END OF SECTION 238126**

**SECTION 238216**  
**AIR COILS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electric coils

**1.02 RELATED SECTIONS**

- A. Specification Section 23 3100 - HVAC Ducts and Casings

**1.03 REFERENCES**

- A. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils
- B. SMACNA - HVAC Duct Construction Standards, Metal and Flexible
- C. NFPA 70 - National Electrical Code

**1.04 SUBMITTALS**

- A. Product Data: Provide coil and frame configurations, dimensions, materials, rows, connections and rough-in dimensions.
- B. Shop Drawings: Indicate coil and frame configurations, dimensions, materials, rows, connections and rough-in dimensions.
- C. Certificates: Certify coil capacities, pressure drops, and selection procedures meet or exceed specified requirements.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in owner's name and registered with manufacturer.

**1.05 QUALITY ASSURANCE**

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

**1.06 REGULATORY REQUIREMENTS**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Protect coil fins from crushing and bending by leaving in shipping cases until installation, and by storing indoors.
- B. Protect coils from entry of dirt and debris with pipe caps or plugs.

**PART 2 PRODUCTS**

**2.01 ELECTRIC COILS**

- A. Manufacturers:
  - 1. INDEECO "QUA" Slip In
  - 2. Brasch
  - 3. Engineer approved equal.
- B. Approvals: Heaters and panel boards shall meet the requirements of the NEC and shall be listed by UL for zero clearance to combustible surfaces and for use with heat pumps and air conditioning equipment.
- C. Heating elements shall be open coil, 80% nickel, 20% chromium, Grade A resistance wire. Type "C" alloys containing iron or other alloys are no acceptable. Coils shall be machine crimped into stainless steel terminals extending at least one inch into the air stream and all terminal hardware shall be stainless steel. Coil shall be supported by ceramic bushings staked into supporting brackets.

- D. Heater frames and terminal boxes shall be corrosion resistant steel. The terminal box shall be NEMA 1 construction and shall be provided with a hinged, latching cover and multiple concentric knockouts for field wiring.
- E. All heaters shall be furnished and with a disc type, automatic reset thermal cutout for primary over temperature protection. All heaters shall also be furnished with disc type, load carrying manual reset thermal cutouts, factory wired in series with heater stages for secondary protection. Heat limiters or other fusible over temperature devices are not acceptable.
- F. Heaters shall be rated for the voltage, phase and number of heating stages indicated in the schedule. All three phase heaters shall have equal, balanced, three phase stages. All internal wiring shall be stranded copper with 105 degree C insulation and shall be terminated in crimped connectors or box lugs.
- G. Terminal blocks shall be provided for all field wiring and shall be sized for installation of 75 degree C copper wire rated in accordance with NEC requirements.
- H. Heaters shall be furnished either with the control option specified in the schedule and described or with the specific components listed in the schedule.
- I. Thermal cutouts, airflow switch, contactors, fuses (if over 48 amps), controls, circuit transformer (where required) and built-in, snap-acting, door interlocked disconnect switch.
- J. Electrical Characteristics: See drawings.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install in accordance with manufacturers written instructions.
- B. Install in ducts and casings in accordance with SMACNA HVAC Duct Construction Standards, Metal and Flexible.
- C. Support coil sections independent of piping on steel channel or double angle frames and secure to casings.
- D. Provide frames for maximum three coil sections.
- E. Arrange supports to avoid piercing drain pans.
- F. Provide airtight seal between coil and duct or casing.
- G. Protect coils to prevent damage to fins and flanges. Comb out bent fins.
- H. Install coils level.
- I. Electric Duct Coils: Wire in accordance with NFPA 70.

#### **3.02 SCHEDULE**

- A. See drawings.

**END OF SECTION 238216**

**SECTION 260050**  
**BASIC ELECTRICAL REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Basic Electrical Requirements specifically applicable to Electrical Division Specification Sections.
- B. Division 26 Specification requirements also include, by reference, all Division 00 and 01 specification sections. This contractor is responsible to review these specification sections. Requirements of these specification sections are included as a part of this contract.
- C. Division 26 Specification requirements also include, by reference, Specification Section 08 7100 - Door Hardware. Review and inclusion of the electrical requirements of this specification section are included as a part of this contract.

**1.02 OWNER OCCUPANCY**

- A. The owner will not occupy the premises during the construction period.
- B. Limit use of site and premises to allow owner occupancy.
- C. Cooperate with the owner to minimize conflict and to facilitate owner's operations.
- D. Schedule the work to accommodate this requirement.

**1.03 REGULATORY REQUIREMENTS**

- A. This contractor shall give proper authorities all requisite notices relating to work in their charge, obtain official permits, licenses for temporary construction and pay proper fees for it.
- B. This contractor is to be solely answerable for and shall promptly make good all damage, injury or delay to other contractors, to neighboring premises or to persons or property of the public by themselves, by their employees or through any operation under their charge, whether in the contract or extra work.
- C. No attempt has been made to reproduce in these specifications any of the rules or regulations contained in city, state or federal ordinances and codes pertaining to the work covered by these specifications that the contractor be thoroughly familiar with all such ordinances and codes.
- D. The fact that said various rules, regulations and ordinances are not repeated in this specification does not relieve the contractor of the responsibility of making the entire installation in accordance with the requirement of those authorities having jurisdiction.
- E. All work shall comply with the applicable recommendations of:
  - 1. The National Board of Fire Underwriters
  - 2. The ANSI-NFPA 70 National Electrical Code
  - 3. The National Fire Protection Association (NFPA)
  - 4. The Occupations Safety and Health Act (OSHA)
  - 5. IBC Building Code (current) and any current applicable city building and or electrical codes.
  - 6. Fire Protection: Conform to International Fire Code (IFC) and NFPA.
  - 7. International Energy Conservation Code (IECC)
- F. Obtain permits and request inspections from authority having jurisdiction.
- G. Conform to latest approved versions of codes.

**1.04 PROJECT/SITE CONDITIONS**

- A. Install work in locations shown on drawings unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of owner and architect/engineer before proceeding.



- C. This contractor, before submitting their bid, shall visit the site of the project to familiarize themselves with locations and conditions affecting their work.
- D. It is the intent of this specification that the contractor furnish all labor and material required to complete the installation as outlined in the drawings and specifications. No additions to the contract price will be allowed due to the failure of this contractor to properly evaluate the effect of existing conditions on the work to be done under this contract.
- E. Whenever renovation or remodeling or relocation of existing equipment is included in the contract, it is imperative that all locations of existing wiring conduits, electrical panels, equipment, services and grades be noted on the job site before bid is submitted and that all elevations and grades be verified before roughing in new work.
- F. This contractor shall provide, as necessary, for the installation of their work and in accordance with materials other than the structure.

#### **1.05 SEQUENCING AND SCHEDULING**

- A. This contractor shall arrange their work in order that it progresses along with the general construction of the building.
- B. This contractor shall be kept informed as to the work of other trades engaged in the project and shall execute their work in such a manner so as not to delay or interfere with progress of other contractors.
- C. Where space for mechanical and electrical lines and piping is limited, it is imperative that all such trades coordinate their work so as to ensure concealment in space provided. Where conflict exists, the engineer shall decide priority of space. If work is not properly coordinated, the engineer may require removal and relocation of work without additional compensation.

#### **1.06 GUARANTEE**

- A. This contractor shall guarantee all of the apparatus, materials, equipment furnished, and labor installed under this contract for a period of one year after date of final acceptance, unless a longer period is specified.
- B. Neither final certificate of payment nor any provisions in the contract documents nor partial or complete occupancy of premises by owner shall constitute an acceptance for work not done in accordance with contract documents or relieve the contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.
- C. Should any defects arise as the result of defective workmanship or material within the guarantee period set forth, this contractor shall make the necessary correction at their own expense.

#### **1.07 ENGINEER APPROVED EQUAL PRODUCTS**

- A. When the engineer, at the request of the interested parties, including the contractor, supplier and manufacturer approved "engineer approved equal" products for this project, such products are approved on the assumption that they will equal or exceed the performance of the products specified.
- B. If such products do not do so after being installed on this project, this contractor shall replace or modify the particular product as necessary to equal the performance of the products specified at no expense to the owner, architect or engineer.
- C. Request for "engineer approved equal" products shall be received by the architect/engineer prior to the last addendum being issued. Requests for substitutions received after this date will not be considered. Substitution requests shall clearly state which products are being considered for substitution. Substitution requests shall include all pertinent product information needed to evaluate the substitution as an "equal".
- D. Similar products shall be all of the same manufacturers and style. There is no exception to this unless prior approval has been granted from engineer.

#### **1.08 OWNER'S RIGHT OF SALVAGE**

- A. Before beginning construction, the contractor shall check and verify with the owner each item of existing equipment that must be removed.
- B. The owner will designate which items of material or equipment not reused that they may wish to keep. The contractor shall then remove these items with care and store in a location designated by the owner for the owner's disposal.
- C. All other items of equipment to be removed and not specified for reuse in new construction or reserved by the owner for their use shall become the property of the contractor and shall be removed from the site.

#### **1.09 PROTECTION AND MAINTENANCE**

- A. The work covered by these drawings and specifications may involve work in both new and remodeled areas of the building.
- B. Where necessary to connect to any existing utility service, this electrical contractor shall contact the owner and shall coordinate any building service connection with the owner so that normal operation to the building is disrupted as little as possible.
- C. Any work to be done in existing structures shall be coordinated with the owner and arrangements made so that traffic flow may be maintained and areas finished where possible before other areas are begun.
- D. This contractor shall protect existing equipment in finished areas from dirt, dust and damage as a result of their work.
- E. Coordinate protection requirements with department heads before beginning construction.
- F. Protect any building openings from unauthorized entry. Coordinate with owner where building entry must be controlled.

#### **1.10 DEMOLITION**

- A. This contractor shall be responsible for the demolition and removal of all existing electrical elements within the project area except as follows:
  - 1. Elements shown on the drawings as "existing to remain and/or to be reused".
  - 2. Elements serving adjacent areas.
  - 3. Elements required for the support of the newly remodeled areas.
  - 4. All elements to be removed are subject to the Owner's Right of Salvage.
- B. Preserve services to the existing facility. Extend/reroute/reconnect the existing systems as required providing for the continued function of these systems.

#### **1.11 CUTTING AND PATCHING**

- A. This contractor shall do all cutting and patching necessary for the installation of his work in all existing and new buildings unless otherwise noted.
- B. In areas where the integrity of new or existing fire separation assembly/wall is compromised by the work, this contractor shall be responsible to patch and/or seal openings as necessary to maintain and/or return fire separation to rating as required by applicable codes.
- C. This contractor shall do all cutting and patching required for his work beyond the remodeled areas unless otherwise noted. All finish work shall include patching to match existing adjacent surfaces. Painting shall be by others.

#### **1.12 CLEANING AND RUBBISH**

- A. This contractor, upon completion of their work, shall remove all rubbish and debris resulting from their operation and shall remove it from site at their own expense.
- B. As far as their work is concerned, all equipment shall be cleaned and the premises left in first class condition.

- C. This contractor shall maintain the work area each day to prevent hazardous accumulation of waste from their work.

#### **1.13 SEALING AND PENETRATION**

- A. Clearance around the piping passing through fire or smoke rated construction shall be sealed to maintain the rated integrity of the construction (1 hr. 2 hrs. etc.). One and two-hour rated assemblies are to be patched on both sides of the assembly.
- B. This contractor shall verify rating and location of all such construction with the architectural drawings and seal all penetrations.
- C. Manufacturer offering products to comply with the requirements include the following:
  - 1. Dow Corning "Silicone RTV Foam"
  - 2. 3-M Corporation "Fire Barrier Caulk and Putty"
  - 3. Thomas & Betts "Flame Safe Fire Stop System"
- D. Installation of these products are to be in strict accordance with the manufacturer's recommendations.
- E. This contractor shall submit shop drawings showing approved sealing assemblies to be utilized on this project.

#### **1.14 ELECTRICAL CONNECTIONS**

- A. This contractor shall mount and wire all magnetic starters, thermal protective switches, and speed changing switches furnished under the mechanical contract and install such starters and switches and wire them to their respective motors as a part of the electrical contract.
- B. All other magnetic starter switches, safety switches and speed control devices indicated on the electrical drawings or specifications are the responsibility of the electrical contractor to furnish and install.
- C. Unless specifically stated elsewhere, the wiring of the temperature control system shall be the responsibility of the mechanical contractor.
- D. The contractor shall provide line voltage power and rough-in for Fire Alarm system. Coordinate required line voltage and installation locations prior to bid.

#### **1.15 HAZARDOUS MATERIALS**

- A. If the contractor stores any hazardous solvents or other materials on the site, they shall obtain copies of the safety data sheets for the materials and post them at the site. The contractor shall inform the owner and all employed of any potential exposure to this material.
- B. At no time shall any product containing asbestos be incorporated into the work.
  - 1. If asbestos materials are encountered, report to the owner. The owner will be responsible for asbestos removal.

#### **1.16 AS-BUILT DRAWINGS**

- A. This electrical contractor shall provide (at the conclusion of the project) one clean, non-torn, neat and legible "as-built" set of drawings to the owner. These drawings shall show the routing of conduit, wiring and equipment drawn in at scaled locations. All circuits shall be labeled and shall conform to labeled panel breakers. All dimensions indicated shall be referenced to a column line. A set of construction drawings will be furnished for this work.
- B. All electrical panels and electrical installed equipment shall be shown on the "as-built" drawings.
- C. Refer to General Specification Sections for additional requirements.
- D. This contractor shall update these drawings during the project at least once a week.

#### **1.17 ALTERNATES**

- A. Refer to description of alternate bids under General Specification Sections.

### **1.18 REVIEW OF MATERIALS**

- A. This contractor shall submit to the engineer for review one (1) electronic copy giving a complete list of materials, fixtures, devices and panels they propose to furnish. The brochure shall contain complete information as to the make of equipment, type, size, capacities, dimensions, and illustration. One of the returned copies shall be kept on the job at all times.
- B. Checking of submittal drawings by the engineer does not relieve the contractor of the responsibility for the accuracy of such drawings and for their conformity to drawings and specifications unless the contractor notifies engineer, in writing, of such deviation at time such drawings are furnished.
- C. All submittals shall have the date marked on them when the contractor receives them from the supplier. Submittals shall be submitted through the contractor and shall not come direct from the supplier to the architect or engineer.
- D. This contractor shall mark the date and sign each set. This indicates that each of them have been checked in their entirety before submitting to the engineer. Submittals that are not dated and signed by the contractor will not be accepted or checked and will be marked "resubmit" and sent back to the contractor.

### **1.19 TEST OF SYSTEMS**

- A. This contractor shall, before concealed, test all systems installed under this contract as called for in these specifications and as required by local codes. Tests shall be made in the presence of the engineer, local authorities or their duly authorized representative. Any defects discovered in testing shall be corrected and the tests repeated until all defects are eliminated.
- B. This contractor shall be held responsible for all damage resulting from defects in the system.
- C. Each individual feeder circuit shall be tested at the panel and in testing for insulation resistance to ground; the power equipment shall be connected for proper operation. In no case shall the insulation resistance to ground be less than that required by the National Electrical Code (NEC).
- D. For 480V systems that are 1,000 amps or greater, this contractor shall provide primary injection testing to satisfy the requirements of the National Electrical Code (NEC) to ensure the ground-fault protection system has been performance tested when first installed on-site and provide a written record of this test to the Owner once completed.

### **1.20 SCOPE OF WORK**

- A. This contractor shall furnish all the labor and material necessary to install a complete electrical system for the building. The system shall include all items of work as outlined in these specifications and on the drawings.
- B. All work shall be performed by a well-qualified, licensed electrician with a thorough knowledge of the various systems involved in this building. It shall be this contractor's responsibility to see that their employees are familiar with all the various codes and tests applicable to this work.
- C. All equipment shall be new and of the type specified by the engineer unless otherwise noted in these specifications or on the drawings to remain and or be reused.
- D. The intent of the specifications and drawings is for complete installation of the systems outlined in the specifications and drawings so that at the conclusion of construction the system will be turned over to the owner complete and ready for safe and efficient operation. The specifications and drawings cannot deal individually with the many minute items that may be eventually required by the nature of the systems.
- E. This contractor is required to furnish and install all such items normally included on systems of this type, which, while not mentioned directly herein or on the drawings are obviously essential to the installation and operation of the system and which are normally furnished on quality installation of this type.

- F. This contractor, before proceeding with any work, shall review the architectural drawings. Any conflict between the electrical and architectural drawings shall be reported to the engineer for clarification.
- G. If there is a discrepancy between the drawings and the specifications or within either document, the more stringent requirement shall be estimated unless brought to the engineer's attention and an addendum is issued for clarification.
- H. The Electrical Contractor shall establish electrical utility elevations prior to fabrication and installation. The Electrical Contractor shall coordinate utility elevations with other trades. All elevations shall be coordinated with all trades in the field prior to installation. When a conflict between trades arises, the design team shall be notified immediately prior to further installation however priority shall be as follows:
  - 1. Lighting Fixtures
  - 2. Gravity flow piping, including steam and condensate.
  - 3. Electrical bus duct.
  - 4. Sheet metal.
  - 5. Cable trays, including access space.
  - 6. Other piping.
  - 7. Conduits and wireway.

#### **1.21 DAILY HOUSEKEEPING AND CLEANING**

- A. At the end of each workday, the contractor shall remove all of their debris, rubbish, tools, and surplus materials from the project work area. The work area shall be broom cleaned and left in a neat and orderly condition. The contractor shall not use the owner's waste disposal facility for the removal of debris from the project.
- B. At end of construction, all equipment shall be cleaned and the premises left in first class condition as far as this contractor's work is concerned.

#### **1.22 ELECTRICAL UTILITY COMPANY**

- A. Any fees by the utility company are to be billed directly to the owner.
- B. The contractor is required to assist the owner in the preparation of all utility company rebate forms that deal with equipment furnished and/or installed as a part of this contractor.

#### **1.23 TELECOMMUNICATIONS UTILITY COMPANY**

- A. Any fees by the telecommunications utility company are to be billed directly to the owner.
- B. The contractor shall be required to provide pathways to the property easement and/or right-of-way. Final Coordination of conduit routing and termination shall be performed by this contractor while communicating with each telecommunications utility company. This shall include telephone, cable television and internet services to the building.

#### **1.24 WALL CONTINUITY (1 HR.)**

- A. All items mounted in 1 hr. rated walls requiring an opening larger than a four inch (4") square (16 sq. inches) require the 1 hr. rating not be degraded.
- B. Any branch panel in a 1 hr. wall will require the exterior of the recessed panel be covered with 5/8 inch fire rated gypsum board. This is true for any device requiring more than a 16 sq. inch opening.

#### **1.25 TRENCHING AND BACKFILLING**

- A. Each contractor is responsible for their own individual trenching and backfilling unless otherwise noted in the drawings or addendum.
- B. All underground utilities, telephone conduit, parking lot lighting, tunnels, etc shall be exactly located prior to digging. This contractor shall be held responsible for all damages caused by failure to do so.

- C. Any backfill shall be tamped and compacted to prevent future settling. The backfill shall be installed to a smooth and level grade and installed in accordance with local codes.
- D. All excess dirt shall be cleared from the area and disposed of as directed by the owner.
- E. Refer to architectural specification sections for additional information.

**1.26 LOW VOLTAGE CONDUIT INSTALLATION**

- A. This contractor shall install conduit serving low voltage cables located in all mechanical rooms and non-accessible areas and exposed structural areas. Use cable trays in other areas as indicated on the drawings. Where cable trays are not accessible, use J-hooks equal to Caddy Cable CAT. Provide hooks with closure holes and cable ties. Mount hooks three foot (3') on center.
- B. This contractor shall install conduit sleeves serving low voltage cables through walls and floors.
- C. Refer to other specification sections for additional information.

**1.27 TEMPORARY POWER AND LIGHTING**

- A. Temporary electrical power and lighting necessary for the construction process is the responsibility of the electrical contractor and shall be included in the base bid amount.

**1.28 DIGITAL MEDIA AGREEMENT**

- A. Computer Aided Drafting (CAD) documents may be available to the contractor for some uses. Contact the engineer prior to bidding to determine what information is available to be transmitted to the contractor in digital form.
- B. When documents are determined to be available, and as requested by the contractor, they will be transmitted upon the completion and execution of the MODUS digital media agreement. A service fee for each document transmitted will be assessed to the contractor. Documents will be transmitted upon payment receipt. Current service fee is \$100.00 per CAD sheet.

**1.29 SECURE NETWORKABLE DEVICES**

- A. Update network devices to the most current software/firmware.
- B. Change default password of all networkable devices.
  - 1. Passwords shall have at least eight characters.
  - 2. Include uppercase and lowercase letters, numerals, and special characters
- C. Supply MAC address and serial number of all networkable devices.
- D. Work with the Owner's IT department to align to existing IT standards.
- E. Provide to the owner a printed and/or electronic spreadsheet log of all network information including, IP addresses, MAC addresses, logins and password information during system training.

**1.30 SYSTEM CONFIGURATION AND PROGRAMMING FILES**

- A. Supply system configuration and programming files where export is available.
- B. Supply uncompiled programming for systems applicable.
- C. All configuration and programming shall be property of the owner at conclusion of the project.

**PART 2 PRODUCTS**

**NOT USED**

**PART 3 EXECUTION**

**NOT USED**

**END OF SECTION 260050**



**SECTION 260090**  
**MINOR ELECTRICAL DEMOLITION FOR REMODELING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. The requirements of the Contract Forms, the Conditions of the Contract, Division 1 - General Requirements and Specification Section 260050 - Basic Electrical Requirements "General Provisions" apply to this section.

**1.02 SCOPE**

- A. This contractor shall be responsible for the demolition and removal of all existing electrical elements within the project area except as follows:
  - 1. Elements shown on the drawings as "existing to remain and/or to be relocated".
  - 2. Elements serving adjacent areas.
  - 3. Elements required for the support of the newly remodeled areas.
- B. Preserve services to the existing facility. Extend, reroute, and reconnect existing systems as required providing for the continued function of these systems.
- C. Demolition shall be accomplished by the proper tools and equipment for the work to be removed. Personnel shall be experienced and qualified in the type of work to be performed.
- D. This electrical contractor shall remove all abandoned equipment, conduit, supports, equipment curbs and bases associated with the remodeled area unless noted otherwise.
- E. This contractor is responsible to provide temporary electrical protection during this project.

**1.03 MATERIALS**

- A. All elements to be removed are subject to the Owner's Right of Salvage.
- B. All materials removed shall be the property of the removing contractor and shall be removed from the site by them, unless otherwise specified.
- C. The owner may designate and have salvage rights to any material herein demolished by this contractor. It will be the owner's responsibility to designate such salvageable items and remove them prior to the contractor working in that area.

**1.04 WORK BY OTHERS**

- A. Unless specifically noted under other contracts, the electrical contractor shall assume they will perform all required work. In general, the following will be performed by others:
  - 1. The mechanical contractor shall be responsible for the cutting and capping of all existing gas, water, sewer, and any other utility service.

**1.05 EXISTING CONDITIONS**

- A. If any existing fixtures or devices that are to remain are disturbed by operations under this contract, the contractor is required to re-establish continuity of such systems.
- B. The electrical contractor shall arrange for the general contractor to repair and patch all construction with material necessary to match surrounding due to removal of equipment and conduit.
- C. The electrical contractor shall furnish all required labor and material, where required, to extend new work to connect to similar work for extension of existing systems.
- D. Demolition plans are based on casual field observations and existing record documents. Report discrepancies to the owner before disturbing existing installation. Beginning of demolition means installer accepts existing conditions.



## **PART 2 PRODUCTS**

### **NOT USED**

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify field-circuiting arrangements and reconnect as necessary.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities. Reconnect circuits, as required, to prevent de-energizing of remaining receptacles and lights.
- C. Demolition drawings are based on casual field observation and existing record documents. Report discrepancies to the owner before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.
- E. Review existing panels to remain in the area of construction. Notify the design team of any damaged circuit breakers or missing closure plates.
- F. Review existing lighting to remain in the area of construction. Notify the design team of any non-functional lamps, ballasts, or electrical parts.

### **3.02 PREPARATION**

- A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal. Disconnect circuits at the source.
- B. Coordinate utility service outage with local utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits use personnel experienced in such operations. This shall include 600 volt or less systems and low voltage signal circuits.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchover connections. Obtain permission from the owner, at least 48 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections as required.
- E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switch over and connections. Notify owner and local fire service at least 24 hours before partially or completely disabling the system. Minimize outage duration. Make temporary connections to maintain service within construction areas and in areas adjacent to work area.
- F. Existing Telephone System: Maintain existing system in service.

### **3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK**

- A. Demolish and extend existing electrical work under provisions of this section.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring to source of supply.
- D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors and patch surfaces.
- E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide a blank cover for abandoned outlets that have not been removed.
- F. Disconnect and remove abandoned panelboards and distribution equipment.
- G. Disconnect and remove electrical devices and equipment serving utilization removed equipment.

- H. Disconnect and remove abandoned luminaires, brackets, stems, hangers, and other accessories. This contractor shall include in their bid, associated fees for disposal of ballasts and lamps.
- I. Repair adjacent construction and finishes damaged during demolition and extension work.
- J. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- K. Extend existing installation using materials and methods compatible with existing electrical installations or as specified.
- L. The electrical contractor is responsible for removal of lamps and ballast from existing fixtures to be demolished. The electrical contractor is to properly dispose of these items in accordance with codes for hazardous materials.

**3.04 CLEANING AND REPAIR**

- A. Clean and repair existing materials that remain or are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Provide typed circuit directory showing revised circuiting arrangement.
- C. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry.

**3.05 INSTALLATION**

- A. Install relocated materials and equipment.

**END OF SECTION 260090**



**SECTION 260519**  
**ELECTRICAL POWER CONDUCTORS AND CABLES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Building wire
- B. Wiring connectors

**1.02 RELATED SECTIONS**

- A. Specification Section 26 0553 - Identification for Electrical Systems
- B. Specification Section 26 2416 - Panelboards
- C. Specification Section 28 3100 - Fire Detection and Alarm

**1.03 REFERENCES**

- A. NECA Standard of Installation (National Electrical Contractors Association)
- B. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association)
- C. NFPA 70 - National Electrical Code
- D. Product Data: Provide for each cable assembly type.
- E. Test Reports: Indicate procedures and values obtained.
- F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.
- G. NFPA 92B - Smoke Management for Malls, Atria, and Large Spaces
- H. IBC Section 909 - Smoke Control Systems

**1.04 SUBMITTALS**

- A. Project Record Documents: Record actual locations of components and circuits.
- B. Project Record Documents: Provide documentation of the manufacturer's recommended lug torque value for aluminum conductors, the date the lugs were torqued, and installed torque readings.

**1.05 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

**1.06 REGULATORY REQUIREMENTS**

- A. Conform to NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

**1.07 PROJECT CONDITIONS**

- A. Verify that field measurements are as indicated.
- B. Wire and cable routing indicated is approximate unless dimensioned. Include wire and cable lengths within 10 foot of length shown.

**1.08 COORDINATION**

- A. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

## **PART 2 PRODUCTS**

### **2.01 BUILDING WIRE**

- A. Manufacturers:
  - 1. Okanite
  - 2. Bell/Hubbell #BICC
  - 3. American Insulated Wire
  - 4. General Cable
  - 5. Southwire
  - 6. United Copper Industries
  - 7. Encore Wire Corporation
  - 8. Engineer approved equal.
- B. Description: Insulated conductor wire.
  - 1. All wire shall be stranded. Refer to Section 26 0553 Identification for Electrical Systems for conductor color requirements.
  - 2. Provide solid wire pigtails at all wiring devices and lighting control devices.
- C. Conductor:
  - 1. Copper
- D. Insulation Voltage Rating: 600 volts.
- E. Insulation: NFPA 70, type #THHN/THWN-2. All cable installation procedures or sizing shall be based on 75 deg C temperature rating.

### **2.02 WIRING CONNECTORS**

- A. Split Bolt Connectors:
  - 1. Burndy
  - 2. Engineer approved equal.
- B. Spring Wire Connectors:
  - 1. Thomas & Betts
  - 2. Engineer approved equal.
- C. Compression Connectors:
  - 1. Burndy
  - 2. Thomas & Betts
  - 3. Engineer approved equal.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire and cable has been completed.
- C. Verify that raceway installation is complete and supported.

### **3.02 PREPARATION**

- A. Completely and thoroughly swab raceway over two inch (2") in size or buried below grade before installing wire.

### **3.03 WIRING METHODS**

- A. Concealed Dry Interior Locations: Use only building wire, type #THHN/THWN-2 insulation in raceway. Use type #NMC cable in residential areas where approved for use.
- B. Exposed Dry Interior Locations: Use only building wire, type #THHN/THWN-2 insulation in raceway.
- C. Above Accessible Ceilings: Use only building wire, type #THHN/THWN-2 insulation in raceway. Use type #NMC cable in residential areas where approved for use.

- D. Wet or Damp Interior Locations: Use only building wire, type #THHN/THWN-2 insulation in raceway.
- E. Exterior Locations: Use only building wire, type #THHN/THWN-2 insulation, in raceway. Use liquid-tight wiring methods. Use liquid-tight connections.
- F. Underground Installations: Use only building wire, type #THHN/THWN-2 insulation, in raceway. Use liquid-tight wiring methods.
- G. Interior Installations: Use only building wire, type #THHN/THWN-2 insulation, in raceway.
- H. Use wiring methods indicated.

### **3.04 INSTALLATION**

- A. Route wire and cable as required meeting project conditions.
- B. Install cable in accordance with the NECA "Standard of Installation."
- C. Use stranded conductors for feeders and branch circuits larger than 12 AWG.
- D. Use conductors not smaller than 12 AWG for power and lighting circuits. Only pre-manufactured fixture whips are allowed to be 14 AWG.
- E. Use #10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
- F. Use #10 AWG conductors for 20 ampere, 208/240 volt branch circuits longer than 200 feet.
- G. Provide minimum #8 AWG wiring for exterior lighting and power circuits leaving building.
- H. It shall be the responsibility of the electrical contractor to verify all voltage drop and size all wire accordingly.
- I. Pull all conductors into raceway at same time.
- J. Use suitable wire pulling lubricant for building wire #4 AWG and larger.
- K. Protect exposed cable from damage.
- L. Use suitable cable fittings and connectors.
- M. Neatly train and lace wiring inside boxes, equipment and panel boards.
- N. Clean conductor surfaces before installing lugs and connectors.
- O. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- P. Use suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.
- Q. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, #8 AWG and smaller.
- R. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, #10 AWG and smaller. All connections in exterior hand holes shall have liquidtight connections.
- S. Identify and color code wire and cable under provisions of Specification Section 26 0553 - Identification for Electrical Systems. Identify each conductor with its circuit number or other designation indicated.
- T. Do not install multi-wire branch circuits. No sharing of neutral shall be permitted.
- U. Install all conductors and make final connections in accordance with all manufacturer's recommendations.
- V. Circuits indicated as 3-pole and having ECM motor loads shall include a neutral conductor.

### **3.05 FIELD QUALITY CONTROL**

- A. Perform field inspection and testing.
- B. Inspect wire and cable for physical damage and proper connection.

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- C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- D. Verify continuity of each branch circuit conductor.

**END OF SECTION 260519**

**SECTION 260526**

**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Mechanical connectors
- B. Wire

**1.02 RELATED SECTIONS**

- A. Specification Section 27 0526 - Grounding and Bonding for Communication Systems

**1.03 SUBMITTALS**

- A. Product data and manufacturer's installation instructions for non-approved manufacturers shall be submitted for review prior to the bid date.
- B. Submittals shall include:
  - 1. Dimensional drawing for each planned device.
  - 2. Exothermic Connection Certification for installers.

**1.04 SUMMARY**

- A. Provide all labor, materials, and equipment necessary to properly install a grounding system conductor in all new branch wiring and feeder installations, which shall be in full compliance with all applicable codes as accepted by the authorities having jurisdiction. The secondary distribution system shall include a grounding conductor in all raceways in addition to the return path of the metallic conduit.
- B. In general, all electrical equipment (metallic conduit, motor frames, panelboards, etc.) shall be bonded together with a green insulated or bare copper system grounding conductor in accordance with specific rules of Article 250 of the NEC and local codes. The bonding conductor through the raceway system shall be continuous from main switch ground bus to panel ground bar of each panelboard, and from panel grounding bar of each panelboard to branch circuit equipment and devices.
- C. All raceways shall have an insulated copper system ground conductor throughout the entire length of circuit installed within conduit in strict accordance with NEC. The grounding conductor shall be included in total conduit fill determining conduit sizes, even though not included or shown on drawings. All grounding conductors that run with feeders in PVC conduit outside of building shall be bare only.
- D. Provide and install all grounding and bonding as required by the National Electrical Code (NEC) including but not limited to Article 800 of the NEC.

**1.05 REFERENCES**

- A. ANSI/NFPA 70 - National Electrical Code
- B. NFPA 99 - Health Care Facilities
- C. The Joint Commission
- D. Iowa Administrative Code, Chapter 61
- E. IEEE 837-2014: Standard for Qualifying Permanent Connections Used in Substation Grounding
- F. IEEE Emerald Book
- G. IEEE Green Book

**1.06 PROJECT RECORD DOCUMENTS**

- A. Submit record documents to accurately record actual locations of grounding electrodes.
- B. Submit test results of each ground rod.



### **1.07 REGULATORY REQUIREMENTS**

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

## **PART 2 PRODUCTS**

### **2.01 MECHANICAL CONNECTORS**

- A. All grounding connectors shall be in accordance with UL 467 and UL listed for use with rods, conductors, reinforcing bars, etc., as appropriate.
- B. Connectors and devices used in the grounding systems shall be fabricated of copper or bronze materials, and properly applied for their intended use. All connectors and devices shall be compatible with the surfaces being bonded and shall not cause galvanic corrosion by dissimilar metals.
- C. Lugs: Substantial construction, of cast copper or bronze with "ground" (micro-flat) surfaces, twin clamp, and two-hole tongue equal to Burndy QQA Series.
- D. Grounding and Bonding Bushings: Malleable iron.
  - 1. Manufacturers:
    - a. Thomas & Betts
    - b. Engineer approved equal.
- E. Piping Clamps: Burndy GAR-TC Series with a two-hole compression terminal.
- F. Grounding Screw and Pigtail: Raco #983.
- G. Building Structural Steel: Thompson #701 Series heavy duty bronze "C" clamp with two-bolt vise-grip cable clamp or equal.
- H. Mechanical lugs or wire terminals shall be used to bond ground wires together or to junction boxes and panel cabinets.

### **2.02 WIRE**

- A. Material: Stranded copper.
- B. Size to meet NFPA 70 requirements as a minimum. Increase size if called for on drawings or in these specifications.
- C. Insulated THWN (or bare as noted elsewhere).

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Install products in accordance with manufacturer's instructions.
- B. Install grounding electrodes conductor, bonding conductors, ground rods, etc. with all required accessories.
- C. Grounding shall meet (or exceed as required to meet these specifications) all the requirements of the N.E.C., the NFPA, and applicable standards of IEEE.
- D. Where there is a conflict between these specifications and the above applicable codes/standards or between this section of these specifications and other sections, then the most stringent or excessive requirement shall govern. Where there is an omission of a code/standard requirement in these specifications then the current code/standard requirements shall comply.
- E. Requirement in these specifications to comply with a specific code/standard article, etc. is not to be construed as deleting of requirements of other applicable codes/standards and their articles, etc.

### 3.02 GROUNDING ELECTRODES

- A. All connections shall be exothermic welded unless otherwise noted herein. All connections above grade and in accessible locations may be by exothermic clamping with devices UL listed as suitable for use except in locations where exothermic welding is specifically specified in these specifications or called for on drawings.
- B. Ground Resistance:
  - 1. Main Electrical Service (to each building) and Generator Locations:
    - a. Grounding resistance measured at each main service electrode system and at each generator electrode system shall not exceed 5 ohms.
    - b. Other Locations:
      - 1) Resistance to ground of all non-current carrying metal parts shall not exceed 5 ohms measured at motors, panels, busses, cabinets, equipment racks, light poles, transformers, and other equipment.
      - 2) Resistance called for above shall be maximum resistance of each ground electrode prior to connection to grounding electrode conductor. Where ground electrode system being measured consists of two or more ground rod electrodes then the resistance specified above shall be the maximum resistance with two or more rods connected together but not connected to the grounding electrode conductor.
- C. Install additional rod electrodes as required to achieve specified resistance to ground (specified ground resistance is for each ground rod location prior to connection to ground electrode conductor).
  - 1. Provide grounding well with cover at each rod location. Install grounding well top flush with finished grade.
  - 2. Verify that final backfill and compaction has been completed before driving rod electrodes.
  - 3. Install ground rods not less than one foot (1') below grade level and not less than two feet (2') from structure foundation.

### 3.03 GROUNDING ELECTRODE CONDUCTOR

- A. Conductor shall be sized to meet or exceed the requirements of NEC 250 to meet these specifications and/or drawings.

### 3.04 GROUNDING CONDUCTORS

- A. Grounding conductors shall be provided with every circuit to meet (or exceed as required to meet these specifications and/or drawings) the requirements of NEC 250.
- B. At every voltage level, new portions of the electrical power distribution system shall be grounded with a dedicated copper conductor, which extends from termination back to power source in supply panelboard.
- C. Provide separate, insulated (bare if with feeder in PVC conduit outside of building) conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug.
- D. Except as otherwise indicated, each feeder raceway on the load side of the service entrance shall contain a ground conductor sized as indicated and where not shown shall be sized to meet (or exceed as required) these specifications and/or drawings the requirements of NEC 250. The conductor shall be connected to the equipment grounding bus in switchboards and panelboards, to the grounding bus in all motor control centers, and as specified to lighting fixtures, motors, and other types of equipment and outlets. The ground shall be in addition to the metallic raceway and shall be properly connected thereto, using a lug device located within each item enclosure at the point of electric power connections to permit convenient inspection.
- E. Provide green insulated ground wire for all receptacles and for equipment of all voltages. In addition to grounding strap connection to metallic outlet boxes, a supplemental grounding wire and screw equal to Raco No. 983 shall be provided to connect receptacle ground terminal to the box.

- F. All plug strips and metallic surface raceway shall contain a green insulation ground conductor from supply panel ground bus connected to grounding screw on each receptacle in strip and to strip channel. Conductor shall be continuous.
- G. Where integral grounding conductor is specified elsewhere in bus duct construction, provide equivalent capacity conductor from supply switchboard or panelboard grounding bus to the bus duct grounding conductor. Bond integral conductor to bus duct enclosure at each tap and each termination.
- H. All motors, all heating coil assemblies, and all building equipment requiring flexible connections shall have a green grounding conductor properly connected to the frames and extending continuously inside conduit with circuit conductors to the supply source bus with accepted connectors regardless of conduit size or type. This shall include food service equipment, laundry equipment, and all other "Equipment By Owner" to which an electric conduit is provided under this Division.

### **3.05 MAIN ELECTRICAL SERVICE**

- A. Existing Buildings:
  - 1. The electrical contractor shall verify that each building's electrical service is properly grounded as required by the NEC.
  - 2. Provide and install electrical service grounding at each building as called for herein for all existing services that do not comply with the grounding specified above.
  - 3. Supplement existing electrical service grounding at each building as required to comply with all requirements in these specifications.
  - 4. If exterior ground rod electrode does not exist at each buildings main electrical service, provide and install these ground rods as called for main electrical service, exterior of building.
- B. Complete installation shall meet and exceed the requirements of the NEC 250.
- C. Artificial electrodes shall be provided for the main service in sufficient number and configuration to secure resistance specified.
- D. Bond To All Of The Following When Available On Site:
  - 1. Ground Rods.
  - 2. Metal Water Pipe (Interior and Exterior to Building)
  - 3. Building Metal Frame, Structural Steel and/or Reinforced Structural Concrete
  - 4. All Piping Entering or Leaving All Buildings.
  - 5. Provide a main ground, bare copper conductor, sized per applicable table in NEC 250, but in no case less than #2/0, shall be run in conduit from the main switchgear of each building to the building steel in each respective building. Reference NEC 250.104 (c). This ground conductor shall also be run individually from the main switchgear and be bonded to the main water service ahead of any union in pipe and must be metal pipe of length as acceptable by authorities having jurisdiction. Provide properly sized bonding shunt around water meter and/or dielectric unions in the water pipe.
- E. Ground/bond neutral per NEC 250.

### **3.06 LIGHT FIXTURES**

- A. All new and removed/reinstalled fixtures in building interior, and exterior fixtures shall be provided with green grounding conductor, solidly connected to unit. Individual fixture grounds shall be with lug to fixture body, generally located at point of electrical connection to the fixture unit.
- B. All suspended fixtures and those supplied through flexible metallic conduit shall have green ground conductor from outlet box to fixture. Cord connected fixtures shall contain a separate green ground conductor.
- C. Installation shall exceed minimum requirements of NFPA 780.

### **3.07 MISCELLANEOUS GROUNDING CONNECTIONS**

- A. Provide bonding to meet regulatory requirements.
- B. Required connections to building steel shall be with UL accepted non-reversible crimp type ground lugs exothermically welded to bus bar that is either exothermically welded or bolted to steel in locations where weld will affect the structural properties of the steel. Required connections to existing building structural steel purlins/i beams shall be with heavy duty bronze "C" clamp with two bolt vise-grip cable clamp.
- C. Grounding conductors shall be so installed as to permit shortest and most direct path from equipment to ground; be installed in conduit; be bonded to conduit at both ends when conduit is metal; have connections accessible for inspection; and made with accepted solderless connectors brazed or bolted to the equipment or to be grounded; in NO case be a current carrying conductor; have a green jacket unless it is bare copper; be run in conduit with power and branch circuit conductors. The main grounding electrode conductor shall be exothermically welded to ground rods, water pipe, and building steel.
- D. All surfaces to which grounding connections are made shall be thoroughly cleaned to maximum conductive condition immediately before connections are made thereto. Metal rust proofing shall be removed at grounding contact surfaces, for 0 ohms by digital Vm. Exposed bare metal at the termination point shall be painted.
- E. All ground connections that are buried or in otherwise inaccessible locations, shall be welded exothermically. The weld shall provide a connection which shall not corrode or loosen and which shall be equal or larger in size than the conductors joined together. The connection shall have the same current carrying capacity as the largest conductor.
- F. Install ground bushings on all metal conduits entering enclosures where the continuity of grounding is broken between the conduit and enclosure (i.e. metal conduit stub-up into a motor control center enclosure or at ground bus bar). Provide an appropriately sized bond jumper from the ground bushing to the respective equipment ground bus or ground bus bar.
- G. Install ground bushings on all metal conduits where the continuity of grounding is broken between the conduit and the electrical distribution system (i.e. metal conduit stub-up from wall outlet box to ceiling space. Provide an appropriately sized bond jumper from the ground bushing to the respective equipment ground bus or ground bus bar.
- H. Each feeder metallic conduit shall be bonded at all discontinuities, including at switchboards and all sub distribution and branch circuit panels with conductors in accordance with applicable table in NEC 250 for parallel return with respective interior grounding conductor.
- I. Grounding provisions shall include double locknuts on all heavy wall conduits.
- J. Bond all metal parts of pole light fixtures to ground rod at base.
- K. Install grounding bus in all existing panelboards of remodeled areas, for connection of new grounding conductors, connected to an accepted ground point.
- L. Bond together reinforcing steel and metal accessories in pool and fountain structures.
- M. Where reinforced concrete is utilized for building grounding system, proper reinforced bonding shall be provided to secure low resistance to earth with "thermite" type devices, and #10AWG wire ties shall be provided to not less than ten full length rebars that contact the connected rebar.

### **3.08 TESTING AND REPORTS**

- A. Raceway Continuity: Metallic raceway system as a component of the facilities ground system shall be tested for electrical continuity. Resistance to ground throughout the system shall not exceed specified limits.
- B. Ground resistance measurements shall be made on each system utilized in the project. The ground resistance measurements shall include building structural steel, driven grounding system, water pipe grounding system and other accepted systems as may be applicable.

Ground resistance measurements shall be made in normally dry weather, not less than 24 hours after rainfall, and with the ground under test isolated from other grounds and equipment. Resistances measured shall not exceed specified limits.

**3.09 INTERFACE WITH OTHER PRODUCTS**

- A. Interface with communications system installed under other specification sections.

**3.10 FIELD QUALITY CONTROL**

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Use suitable test instrument with current certificate of calibration to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall-of-potential method or signal injection method.

**END OF SECTION 260526**

**SECTION 260529**  
**HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Product requirements
- B. Formed steel channel

**1.02 REFERENCES**

- A. NECA Standard of Installation (National Electrical Contractors Association)
- B. NFPA 70 - National Electrical Code

**1.03 SUBMITTALS**

- A. Product Data: Provide manufacturers catalog data for fastening systems.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of products.

**1.04 REGULATORY REQUIREMENTS**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

**PART 2 PRODUCTS**

**2.01 PRODUCT REQUIREMENTS**

- A. Materials and Finishes:
  - 1. Corrosion resistant.
  - 2. Select materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Anchors and Fasteners:
  - 1. Concrete Structural Elements: Use expansion anchors and preset inserts.
  - 2. Steel Structural Elements: Use beam clamps and welded fasteners.
  - 3. Concrete Surfaces: Use self-drilling anchors and expansion anchors.
  - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.
  - 5. Solid Masonry Walls: Use expansion anchors and preset inserts.
  - 6. Sheet Metal: Use sheet metal screws.
  - 7. Wood Elements: Use wood screws.
- C. Staples:
  - 1. Wood Elements: UV resistant polyethylene saddles. For use with non-metallic sheathed cable only.

**2.02 FORMED STEEL CHANNEL**

- A. Manufacturers:
  - 1. Globe Strut
  - 2. Uni-Strut
  - 3. Kindorf
  - 4. Power-Strut
  - 5. Erico
  - 6. Engineer approved equal.
- B. Description: Galvanized steel.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions and utility company regulations where applicable.
- B. Provide anchors, fasteners and supports in accordance with NECA "Standard of Installation".
  - 1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
  - 2. Do not use spring steel clips and clamps.
  - 3. Do not use powder-actuated anchors.
  - 4. Do not drill or cut structural members.
- C. Fabricate supports from structural steel or formed steel members or steel channel. Rigidly weld members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- D. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- E. Use steel channel supports to stand cabinets and panelboards one inch (1") off wall in all wet and damp locations.
- F. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- G. Reinforce outdoor concrete pads with 1/2 inch steel reinforcing bars on 12 inch centers or as shown on the drawings.
- H. All pathways and hangers shall be independently hung.
- I. All pathways shall be routed overhead unless otherwise noted or approved by engineer.

**END OF SECTION 260529**

**SECTION 260533**  
**RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Conduit requirements
- B. Conduit types
- C. Box types

**1.02 REFERENCES**

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated
- C. ANSI C80.5 - Rigid Aluminum Conduit
- D. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
- E. ANSI/NFPA 70 - National Electrical Code
- F. NEMA 250 - Enclosures for Electric Equipment
- G. NEMA WD 6 - Wiring Device Configurations
- H. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
- I. NECA (National Electrical Contractor's Association) Standard of Installation
- J. NEMA WD 6 - Wiring Device Configurations
- K. TIA-569-B - Commercial Building Standard for Telecommunications Pathways and Spaces
- L. NEMA OS 2 – Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2013 (ANSI/NEMA OS2)
- M. UL 514C- Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers; Current Edition, Including All Revisions

**1.03 RELATED SECTIONS**

- A. Specification Section 27 0526 - Grounding and Bonding for Communications Systems

**1.04 PROJECT RECORD DOCUMENTS**

- A. Accurately record actual routing of conduits larger than two inches.
- B. Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

**1.05 REGULATORY REQUIREMENTS**

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

**1.06 SUBMITTALS**

- A. Product Data: Provide dimensions, knockout sizes and locations, materials, fabrication details, finishes, and accessories.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.



### 1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

### 1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to the site.
- B. Accept products on site. Inspect for damage.
- C. Protect products from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

### 1.09 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on the drawings.
- B. Verify routing and termination locations of conduit prior to rough in.
- C. Conduit routing is shown on the drawings in approximate locations unless dimensioned. Route as required completing the wiring system.

## PART 2 PRODUCTS

### 2.01 CONDUIT REQUIREMENTS

- A. Minimum Size: 1/2 inch and 3/4 inch for power wiring and 1 inch for low voltage wiring unless noted otherwise.
- B. Size conduit per ANSI/NFPA 70.
- C. Underground Installations:
  - 1. Within Five Feet (5') from Foundation Wall Including Below Building Slab: Use rigid steel conduit or schedule 80 PVC conduit.
  - 2. More Than Five Feet (5') from Foundation Wall: Use rigid steel conduit or schedule 80 PVC conduit.
  - 3. Where PVC conduit is utilized below slab, provide transition from PVC to rigid steel prior to elbow up and then as continuous rigid conduit through slab. No PVC conduits shall penetrate vertically through concrete slab.
  - 4. Minimum Size: One inch.
  - 5. Provide warning tape.
- D. Above Grade Outdoor Locations: Use rigid steel and aluminum conduit. Aluminum conduit shall not contact concrete mortar or block.
- E. Above Grade In or Under Slab:
  - 1. Use rigid steel conduit or schedule 80 PVC conduit.
  - 2. Maximum Size Conduit in Slab: Total of 50% of pour depth.
  - 3. Minimum Size: One inch.
  - 4. Where PVC conduit is utilized below slab, provide transition from PVC to rigid steel prior to elbow up and then as continuous rigid conduit through slab. No PVC conduits shall penetrate vertically through concrete slab. Unless PVC conduit is stalled below bottom-fed ground mounted equipment. PVC conduits may penetrate the slab as long as a box-out is provided in the slab to allow for conduit to pass through. Backfill box-out with pea gravel once conduits have been installed.
- F. Wet and Damp Locations:
  - 1. Use rigid steel conduit and intermediate metal conduit.
  - 2. Wiring methods for pool and pool equipment rooms as defined in NEC 680.14 shall be listed and identified for use in such areas. Use rigid metal conduit, intermediate metal conduit, rigid polyvinyl chloride conduit, or reinforced thermosetting resin conduit in these areas where subject to a corrosive environment.
- G. Dry Locations:
  - 1. Concealed: Use rigid steel conduit, intermediate metal conduit or electrical metallic tubing.

2. Exposed: Use rigid steel conduit, intermediate metal conduit or electrical metallic tubing.

## 2.02 CONDUIT TYPES

- A. Metal Conduit:
  1. Rigid Steel Conduit: ANSI C80.1
  2. Rigid Aluminum Conduit: ANSI C80.5
  3. Intermediate Metal Conduit (IMC): Rigid steel
  4. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit.
- B. Flexible Metal Conduit:
  1. Description: Interlocked steel construction.
  2. Fittings: ANSI/NEMA FB 1.
- C. Liquidtight Flexible Metal Conduit:
  1. Description: Interlocked steel construction with PVC jacket.
  2. Fittings: ANSI/NEMA FB 1.
- D. Electrical Polyvinyl Chloride (PVC):
  1. Description: Synthetic Thermoplastic
  2. Fittings: NEMA TC3/UL 651
  3. Joints: ASTM D2855 solvent weld with ASTM D2564 solvent cement.
- E. Electrical Metallic Tubing (EMT):
  1. Description: ANSI C80.3; galvanized tubing.
  2. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel compression type with steel lock nut, and ring or steel setscrew fittings.
- F. Pre-manufactured Fixture Whips:
  1. Manufacturers:
    - a. Southwire
    - b. EPCO
    - c. Engineer approved equal.
  2. Description: UL listed flexible conduit with conductors and die-cast screw connectors on the end.
  3. Size: no longer than 6', 3/8" diameter.
  4. Wire: 14 AWG minimum for lighting and required by the load.
  5. Install between junction box and light fixture only in concealed and unfinished spaces. Use interior raceway or surface raceway where exposed in finished spaces.
- G. Fittings and Conduit Bodies:
  1. NEMA TC 3
  2. Install offsets at surface boxes.
  3. Install single hole strap connectors on all exposed conduit one inch (1") and smaller.

## 2.03 BOX TYPES

- A. General Requirements:
  1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
  2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
  3. Provide a low voltage partition divider plate for applications where low voltage and line voltage circuits share the same outlet box.
- B. Outlet Boxes:
  1. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel.
    - a. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported. Include 1/2 inch male fixture studs where required.
    - b. Concrete Ceiling Boxes: Concrete Type.

2. Sheet Metal Communications Boxes: ANSI/NEMA OS 1, galvanized steel. Minimum of 4-11/16 inch square with a depth of 2-1/8 inch.
  - a. Refer to the drawings for plaster ring size/opening.
3. PVC Molded Construction box: 2 hour fire rating. Captive nails and bracket support. For use with non-metallic sheathed cable. May be used in wood construction on multi-family residential new construction projects only. UL listed.
  - a. Use nonmetallic boxes when exposed rigid PVC conduit is used.
  - b. Nonmetallic Boxes: Comply with NEMA OS 2; and list and label as complying with UL 514C.
- C. Cast Boxes: NEMA FB 1, type #FD, cast alloy. Provide gasket cover by box manufacturer.
- D. Floor Boxes:
  1. ANSI/NEMA OS 1, semi-adjustable.
  2. Material: Formed steel.
  3. Shape: Rectangular.
  4. Conform to regulatory requirements to concrete tight floor boxes.
- E. Pull and Junction Boxes:
  1. Sheet Metal Boxes: NEMA OS 1 galvanized steel.
  2. Surface Mounted Cast Metal Box: NEMA 250, type #4 and #6, flat-flanged, surface mounted junction box:
    - a. Material: Galvanized cast iron.
  3. Cover: Furnish with ground flange, neoprene gasket and stainless steel cover screws.
  4. Fiberglass Hand Holes:
    - a. Die molded fiberglass hand holes.
    - b. Cable Entrance: Precut 6" x 6" cable entrance at center bottom of each side.
    - c. Cover: Fiberglass weatherproof cover with nonskid finish and light traffic rating.

### **PART 3 EXECUTION**

#### **3.01 CONDUIT INSTALLATION**

- A. Install conduit in accordance with NECA "Standard of Installation."
- B. Arrange supports to prevent misalignment during wiring installation.
- C. Support conduit using coated steel, malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- D. Group related conduit support using conduit rack. Construct rack using steel channel and provide space on each for 25% additional conduits.
- E. Fasten conduit supports to building structure and surfaces.
- F. Do not support conduit with perforated pipe straps. Remove wire used for temporary supports.
- G. Do not use spring steel clips and clamps for support.
- H. Install compression type fittings in all wet and damp areas.
- I. Do not attach conduit to ceiling support wires.
- J. Arrange conduit to maintain headroom and present neat appearance.
- K. Route exposed conduit parallel and perpendicular to walls.
- L. Route conduit installed above accessible ceilings, parallel and perpendicular to walls.
- M. Route the conduit in and under slab from point-to-point.
- N. Do not cross conduits in slab.
- O. Maintain adequate clearance between conduit and piping.
- P. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degree F.

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- Q. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- R. Bring conduit to shoulder of fittings; fasten securely.
- S. Use conduit hubs to fasten conduit to cast boxes.
- T. A run of conduit shall not contain more than the equivalent of four (4) quarter bends (360 degrees), including those bends located immediately at the outlet or body. Use conduit bodies to make sharp changes in direction (as around beams). Use hydraulic one-shot bender to fabricate bends in metal conduit larger than two inch (2") size. All conduit shall be held right to structure.
- U. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- V. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- W. Provide suitable pull string in each empty conduit except sleeves and nipples.
- X. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- Y. Ground and bond all conduits.
- Z. Identify conduit.
- AA. Use flexible and liquidtight conduits where required by NEC.
- AB. Flexible conduit up to six feet (6') in length can be used to connect mechanical equipment with motors, compressors, light fixtures or unless directed by engineer.
- AC. Install insulated bushings on all conduits and sleeves serving low voltage wiring prior to pulling wire unless otherwise noted.
- AD. Install grounded insulated bushings on all conduits and sleeves serving data wiring prior to pulling wire unless otherwise noted.
- AE. All low voltage conduits shall be sized to have less than 40% fill. Each penetration through a surface of any kind shall have a conduit sleeve with insulated bushings.
- AF. Junction boxes shall not be installed over four foot (4') above accessible ceiling without prior written approval by owner.
- AG. Where conduits are installed below floors, they must first rise to the ceiling cavity of the room before dropping down walls to devices.
- AH. Conduits which enter communications entrance facilities shall extend 4 inches above the finished floor or 3 inches through the wall.
- AI. Minimum bend radius for communications conduits:
  - 1. For conduits 2" or less, maintain a minimum bend radius of (6) times the actual inside diameter of the conduit.
  - 2. For conduits greater than 2", maintain a minimum bend radius of (10) times the actual inside diameter of the conduit.
- AJ. Communications conduits shall have no more than two (2) 90 degree bends between pull points and contain no continuous sections longer than 100 feet. Insert pull points or pull boxes for conduits exceeding 100 feet in length.
  - 1. A third bend is acceptable if:
    - a. The total run is not longer than (33) feet.
    - b. The conduit size is increased to the next trade size.
- AK. No continuous section of conduit may exceed 100 feet. Utilize pull boxes as necessary. Refer to the pull box execution section for more information.
- AL. All wiring in the same conduit shall be from the same source and have the same voltage except where approved by the owner.

- AM. Exterior rooftop pathways shall be supported above roofing membrane utilizing rubber type support bases with 12 ga. galvanized channel supports (Copper B-Line Dura-Block or equivalent). Adjust height as necessary for compliance with NEC.
- AN. For conduit installed in precast concrete walls or floors, it shall be acceptable to utilize Schedule 40 PVC conduit in lieu of EMT.

### 3.02 BOX INSTALLATION

- A. Install boxes in accordance with NECA "Standard of Installation."
- B. Install electrical boxes in locations as shown on the drawings and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- C. Set wall mounted boxes at elevations to accommodate mounting heights as indicated.
- D. Electrical boxes are shown on the drawings in approximate locations unless dimensioned. Adjust box location up to ten foot (10') if required to accommodate intended purpose. Verify with architectural drawings and elevations for additional information.
- E. Orient boxes to accommodate wiring device orientation.
- F. Maintain headroom and present neat mechanical appearance.
- G. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only. Junction boxes shall not be installed over four foot (4') above accessible ceilings.
- H. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than six inches (6") from ceiling access panel or from removable recessed luminaire.
- I. Fire-stop boxes to preserve fire resistance rating of partitions and other elements. Boxes may be installed within a minimum of 24 inch separation with written approval prior to installation.
- J. Coordinate mounting heights and locations of outlets mounted above counters, benches, and back splashes.
- K. Locate outlet boxes to allow luminaires positioned as shown on the drawings. If light fixture locations conflict with ceiling plans, the electrical contractor shall document discrepancies and send to the engineer for clarification.
- L. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- M. Use flush mounting outlet box in finished areas.
- N. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- O. Do not install flush mounting box back-to-back in wall, provide minimum six inch (6") separation.
- P. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- Q. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- R. Use adjustable steel channel fasteners for hung ceiling outlet box.
- S. Do not fasten boxes to ceiling support wires.
- T. Support boxes independently of conduit.
- U. Use gang box where more than one device is mounted together. Do not use sectional box.
- V. Use gang box with plaster ring for single device outlets.
- W. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- X. Use cast iron floor boxes for installation in slab on-grade, formed steel boxes are acceptable for other installations unless otherwise noted.
- Y. Set floor boxes level.
- Z. Large Pull Boxes: Use set screw enclosure in interior dry locations, surface-mounted cast metal box in other locations.

- AA. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- AB. Group devices associated with each other eight inches (8") on center (i.e. receptacle, data, voice outlet).
- AC. All floor mounted device locations shall have a dimensioned drawing from the Architect prior to installation.

**3.03 PULLBOXES**

- A. Size communications cabling pull boxes according to the following:

Conduit Trade Size	Width	Length	Depth	Width Increase for Additional Conduit
1"	4"	16"	3"	2"
1-1/4"	6"	20"	3"	3"
1-1/2"	8"	28"	4"	4"
2"	8"	36"	4"	5"
2-1/2"	10"	42"	5"	6"
3"	12"	48"	5"	6"
4"	16"	60"	8"	6"

- B. Directional changes within a pullbox shall not be allowed. Conduit entering the box shall have conduit leaving the box from the opposite side. Do not use a pull box to make 90 degree turns.
- C. Install pullboxes in conveniently accessible locations.
- D. Where identified on drawings as lockable, key all pullboxes the same.
- E. Label all pull boxes. Handwritten labels shall not be accepted.

**3.04 INTERFACE WITH OTHER PRODUCTS**

- A. Install conduit using materials and method to preserve fire resistance rating of partitions and other elements.
- B. Piping and Ductwork: Route conduits through roof openings or through suitable roof jack with pitch pocket. Coordinate location with roofing installation specified.
- C. Coordinate installation of outlet and junction boxes for equipment connection.

**3.05 ADJUSTING**

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closures in unused box openings.
- C. Adjust floor box flush with finish flooring material.

**3.06 CLEANING**

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.

**END OF SECTION 260533**



**SECTION 260553**  
**IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nameplates and labels
- B. Wire markers
- C. Conduit markers
- D. Identification

**1.02 REFERENCES**

- A. NFPA 70 - National Electrical Code
- B. NFPA 70E - Standard for Electrical Safety in the Workplace

**1.03 SUBMITTALS**

- A. Product Data: Provide catalog data for nameplates, labels and markers.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

**1.04 REGULATORY REQUIREMENTS**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

**PART 2 PRODUCTS**

**2.01 NAMEPLATES AND LABELS**

- A. Nameplates:
  - 1. Normal power: Engraved three-layer laminated plastic white letters on black background.
- B. Locations:
  - 1. All electrical distribution and control equipment enclosure.
    - a. Switchboards and Panelboards: Line 1 shall state "Panel Name"; Line 2 shall state "Fed by Panel Name" as required by NEC section 408.4(B).
  - 2. Communication cabinets.
  - 3. Single mounted breaker.
  - 4. Transfer switch.
  - 5. Transformer.
  - 6. Fire alarm devices.
- C. Letter Size:
  - 1. Use 1/8 inch letters for identifying individual equipment and loads.
  - 2. Use 1/4 inch letters for identifying grouped equipment and loads.
  - 3. Use 1/4 inch letters for identifying communications cabinets, transfer switches and transformers.
- D. Labels: Embossed adhesive tape with 3/16 inch white letters on black background. Use only for identification of individual wall switches and receptacles, control device stations, and communication outlets.

**2.02 WIRE MARKERS**

- A. Description: Tape feeders to indicate phases.
- B. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.



- C. Legend:
1. Power and Lighting Circuits: Branch circuit or feeder number indicated.
  2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams.

### 2.03 CONDUIT MARKERS

- A. Location: Mark conduit longer than 20 feet.
- B. Spacing: 30 feet on center.
- C. Color:
1. 208 Volt System: Black
  2. Fire Alarm System: Red
  3. Other Systems: Green
- D. Legend:
1. 208 Volt System: L- (name of feeder)
  2. Fire Alarm System: FA
  3. Telephone System: TS
  4. Computer System: CS

### 2.04 IDENTIFICATION

- A. Identify All Junction Boxes With Appropriate Marker As Follows:
1. 208 Volt System: Black (circuit name and number)
  2. Fire Alarm System: Red
- B. Series rating identification:
1. Upstream devices of series rated components not enclosed in a single NEMA type enclosure shall be identified with a nameplate using 1/8-inch lettering height reading "CAUTION - SERIES RATED SYSTEM - IDENTICAL COMPONENT REPLACEMENT REQUIRED".
  2. Downstream devices of series rated components not enclosed in a single NEMA type enclosure shall be identified with a nameplate using 1/8-inch lettering height reading "CAUTION - SERIES RATED SYSTEM - ADDITIONAL SERIES COMBINATION RATING: XX,XXX RMS SYMMETRICAL AMPERES" where XX,XXX shall be the series combination rating.
- C. Write the circuit number of each device inside the device box (not ON the device cover). All receptacles and light switches (new and existing) shall have the final circuit number installed on each device cover with a nylon label. Coordinate exact requirements with the owner prior to installation.
- D. Temporary label all outlets and switches with circuit numbers.
- E. Label all outlets and switches with an adhesive label identifying panel and circuit the device is energized by.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

### 3.02 INSTALLATION

- A. Install nameplate and label parallel to equipment lines.
- B. Secure nameplate to equipment front using screws.
- C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.
- D. Identify conduit using field painting.
- E. Paint colored band on each conduit longer than 6 feet.

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- F. Paint bands 20 foot on center.
- G. Identify underground conduits or wiring using one underground warning tape per trench at three inch (3") below finished grade.

**END OF SECTION 260553**



**SECTION 260943**  
**DIGITAL LIGHTING CONTROL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Digital wall control
- B. Digital occupancy/vacancy sensors
- C. Digital room controllers
- D. Low voltage cables
- E. Wall face plates

**1.02 RELATED SECTIONS**

- A. Specification Section 26 0533 - Raceway and Boxes for Electrical Systems
- B. Specification Section 26 2726 - Wiring Devices
- C. Specification Section 26 5100 - Interior Lighting
- D. Specification Section 26 5200 - Emergency Lighting Equipment
- E. Specification Section 26 5600 - Exterior Lighting

**1.03 REFERENCES**

- A. NECA - Standard of Installation
- B. NEMA WD 1 - General Requirements for Wiring Devices
- C. NEMA WD 6 - Dimensional Requirements for Wiring Devices
- D. NFPA 70 - National Electrical Code
- E. UL 916 - Energy Management Equipment
- F. UL 924 - Standard for Emergency Lighting and Power Equipment

**1.04 SUBMITTALS**

- A. Product Data: Provide catalog data for nameplates, installation instructions, labels and markers, ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- C. Shop Drawings:
  - 1. Composite wiring and/or schematic diagram of each control circuit as proposed to be installed.
  - 2. Show exact location of all digital devices, including at minimum sensors, load controllers, and switches for each area on reflected ceiling plans.
  - 3. Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies and proof that the sensor is suitable for the proposed application.
  - 4. Network riser diagram including floor and building level details. Include network cable specification and end-of-line termination details, if required. Illustrate points of connection to integrated systems. Coordinate integration with mechanical and/or other trades.
  - 5. Product information sheets for all components and wiring provided. Include standard options for each product and color offerings.
  - 6. Submit manufacturer sensor coverage patterns applicable to this project. For areas requiring multiple sensor devices for appropriate coverage, submit specific manufacturer approved sensor layout as an overlay directly on the project drawings

- D. Closeout Submittals:
  - 1. Project Record Documents: Record actual installed locations and settings for lighting control devices.
  - 2. Operation and Maintenance Manual:
    - a. Include approved Shop Drawings and Product Data.
    - b. Include Sequence of Operation, identifying operation for each room or space.
    - c. Include manufacturer's maintenance information.
    - d. Operation and Maintenance Data: Include detailed information on device programming and setup.
    - e. Include startup and test reports.
  - 3. Provide list of Extra Materials for owner to verify and sign for acknowledgement of receiving

### **1.05 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum five years' experience.
- B. All room control devices and panels shall be provided with a five-year limited manufacturer's warranty, including one for one device replacement.

### **1.06 REGULATORY REQUIREMENTS**

- A. Digital Lighting Management System shall accommodate the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories that suit the required lighting and electrical system parameters.
- B. Conform to requirements of NFPA 70.
- C. Provide products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.
- D. System shall comply with FCC emission standards specified in part 15, sub-part J for commercial and residential application.

### **1.07 APPROVED MANUFACTURERS**

- A. All equipment specified in this specification shall be manufactured by one of the below listed companies unless specified elsewhere. Model numbers stated in this specification are for basis of design information only.
  - 1. Digital Lighting Control Systems:
    - a. Hubbell Control Solutions - NX Series (Basis of Design)
    - b. Lutron
    - c. Crestron
    - d. Acuity Brands
    - e. Leviton
    - f. Wattstopper
    - g. Engineer approved equals.

### **1.08 SYSTEM TYPE**

- A. System shall be wired.

## **PART 2 PRODUCTS**

### **2.01 DIGITAL WALL CONTROL**

- A. Refer to the lighting sequence of operations or schedule on the drawings for additional requirements.
- B. Low voltage momentary, self-configuring, digitally addressable pushbutton on/off, and scene selection.
  - 1. Basis of Design: Hubbell NX Series - Smart Switch

2. Description: Fully addressable pushbutton switch with LED status indicators, up to 6 button configuration with on/off, raise/lower and dimming functionality in a single gang. Decorator style design.
3. Part of a digital lighting control system and can control any load(s) connected to room controller.
4. Load and Scene button function may be reconfigured for individual buttons from Load to Scene, and vice versa. Scene patterns may be saved to any button. Once set, buttons may be digitally locked to prevent overwriting of the preset levels.
5. Device shall have removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement shall be completed without removing the switch from the wall.
6. All digital parameter data programmed into an individual wall control shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.

## **2.02 DIGITAL OCCUPANCY/VACANCY SENSORS**

- A. Refer to the lighting sequence of operations or schedule on the drawings for additional requirements.
- B. Self-configuring, digitally addressable, calibrated wall or ceiling mounted; passive infrared (PIR), ultrasonic or dual technology.
  1. Sensors shall be able to be digitally calibrated in the field with the ability to adjust the sensitivity and time delay.
  2. Sensor shall be programmed to control specific loads within a local network. Devices shall be able to be assigned to a specific load within the room without wiring or special tools.
  3. Sensor shall have adjustable re-trigger time for all manual-on loads.
  4. All parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.
  5. Wire all per manufacturer's recommendations.
  6. Wire multiple sensors serving the same area to operate as a single unit.
  7. Provide and install room controllers as required to obtain switching pattern shown on the drawings.
  8. Sensors shall have a time delay that is can be adjusted from 5 to 30 minutes, set in field.
  9. Provide with optional relay (N/O + N/C contacts, SPDT, 500 mA rated @ 24VDC) for mechanical integration and local HVAC control.

## **2.03 DIGITAL ROOM CONTROLLERS**

- A. Digital controllers for lighting zones and fixtures that automatically bind room loads to the connected control devices in the space without commissioning or the use of any tools. Provide controllers to match the room lighting and plug load control requirements.
- B. Devices shall automatically configure the room to the most energy-efficient sequence of operation based upon the devices in the room.
- C. Self-configuring, digitally addressable one, two or three relay plenum-rated controllers for on/off or selected dimming control.
  1. Basis of Design: Hubbell Control Solutions - NX Room Controller
  2. Controller shall match the room lighting sequence and control type requirements.
  3. Dual voltage (120/277 VAC, 60 Hz) capable rated for 20A total load
  4. Wire per manufacturer's recommendations.
  5. Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power: Turn on to 100 percent, turn off, turn on to last level.
  6. Dimming room controllers shall have options for 0-10 volt or line voltage forward phase control dimming outputs and integral current monitoring capabilities.

7. Devices shall have a minimum of two RJ-45 local network ports.
8. All parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.
9. Room controller shall be capable of being programmed through Bluetooth technology via a free app and via a local area connection.

#### **2.04 LOW VOLTAGE CABLES**

- A. Field-Terminated
  1. Digital room devices shall connect to the local network using field-terminated cables, which provide both data and power to room devices.
  2. Cable shall be plenum rated Cat 5e with RJ-45 connectors. Maximum cable run, and cable ratings shall meet manufacturer's requirements.
  3. Each field-terminated cable shall be tested following installation and testing results submitted to the Manufacturer's Representative for approval prior to proceeding with the work.
  4. Low voltage wiring topology must comply with manufacturer's specifications.
  5. Installing contractor shall meet all qualifications discussed in section 27 1005 -Telecommunications Cabling Infrastructure.

#### **2.05 WALL FACE PLATES**

- A. Cover Plate:
  1. Basis of Design: Pass & Seymour #SS (Metal), to be confirmed by architect.
  2. Provide cover plate for all devices and provide multiple gang plates where required.
- B. Jumbo Cover Plate:
  1. Basis of Design: Pass & Seymour #SSO (Metal) to be confirmed by architect.
  2. Provide cover plate for all devices and provide multiple gang plates where required.
  3. Provide jumbo plates on masonry rough-in. Verify with architect prior to work being performed.

### **PART 3 EXECUTION**

#### **3.01 SAMPLES**

- A. Upon request, electrical contractor is to provide a sample of any device specified in any available color.

#### **3.02 COLOR**

- A. All colors of devices, flanges, and faceplates shall be determined during the submittal process by the Architect. In the electrical bid, include any allowances needed to allow for selection of all cataloged colors.

#### **3.03 EXAMINATION**

- A. Verify that boxes are installed at proper height.
- B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

#### **3.04 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

#### **3.05 INSTALLATION**

- A. Install in accordance with NECA "Standard of Installation."
- B. Install devices plumb and level.
- C. Low voltage wiring topology must comply with manufacturer's specifications

- D. All line voltage connections shall be tagged to indicate circuit and switched legs.
- E. Install wall plates on switches in finished areas.
- F. Test all devices to ensure proper communication.
- G. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings. Adjust time delay so that controlled area remains lighted while occupied.
- H. All Class II cabling shall enter enclosures from within low-voltage wiring areas and shall remain within those areas. No Class I conductors shall enter a low-voltage area.
- I. Run separate neutrals for any phase dimmed branch load circuit. Different types of dimming loads shall have separate neutral.
- J. Furnish the Company's system which accommodates the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories which suit the lighting and electrical system parameters.
- K. Digital controllers for lighting and plug loads shall automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room and plug load controllers shall be provided to match the room lighting and plug load control requirements.
- L. Devices shall have status notification that indicates: data transmission, device power, load status and configuration status.
- M. Each load shall be capable of the following behavior on power up following the loss of normal power: turn on to 100%, turn off, turn on to last level.
- N. All devices installed above ceilings shall be UL 2043 plenum rated.
- O. All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.
- P. Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver.
- Q. Network signal integrity on low-voltage cables require that each conductor and ground wire be correctly terminated at every connected device.
- R. All low voltage cabling routed exposed in common and public areas shall be installed in EMT conduit. Coordinate final conduit routings with the Architect in the field during installation. Conduit installation shall meet all requirements listed in Section 26 0533 - Raceway and Boxes for Electrical Systems.

### **3.06 INTERFACE WITH OTHER PRODUCTS**

- A. Coordinate locations of outlet boxes provided under Specification Section 26 0533 - Raceway and Boxes for Electrical Systems to obtain mounting heights indicated on the drawings. Before roughing in any floor devices the electrical contractor shall obtain a dimensioned drawing signed by the owner showing device locations.
- B. Coordinate the placement of lighting control devices with millwork, furniture, equipment, door swings, etc. installed by others. Notify engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- C. Coordinate requirements of A/V devices and shades that interface with lighting control system. Provide all required relays and connections required if they are controlled by the lighting control system.



### **3.07 OVERSIGHT AND COMMISSIONING**

- A. At the start of construction, the contractor shall be responsible for organizing a pre-construction lighting controls meeting with contractor, manufacturer representative, owner, design team. The manufacturer rep shall provide samples of all products for review at this meeting.
- B. Supplier to verify layout of occupancy sensor devices during submittal process and all suggestions are to be brought to the engineer's attention immediately. After manufacturer's layouts have been approved, it shall be the responsibility of the manufacturer to ensure that the system operates per lighting control sequence as detailed on construction documents.
- C. Supplier is to give instructions to the electrical contractor for installation locations. Locations, shown on the drawings, are intended to provide device count for bidding. All placement must be per manufacturer's recommendations.
- D. Electrical contractor to install devices per manufacturer's layout. It shall be the responsibility of the contractor to verify that all quantities and device types are appropriate for space.
- E. Set IP addresses and other network settings of system front end hardware per facilities IT instructions.
- F. Supplier is to visit site, calibrate, and verify that the control of each space complies with the Sequence of Operation at substantial completion of building. Coordinate this meeting with project engineer.
- G. Supplier is to visit site and confirm proper operation of all automatic occupancy devices one month after owner occupancy. Supplier shall make modifications and calibrations as needed.
- H. Manufacturer shall provide the owner with one working configuration tool (device or app) with instructions on how to wireless facilitate customization of devices post occupancy.

### **3.08 FIELD QUALITY CONTROL**

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Factory telephone support shall be available at no cost to the Owner following acceptance. Factory assistance shall consist of assistance in solving application issues pertaining to the control equipment.

### **3.09 ADJUSTING**

- A. Adjust devices and wall plates to be flush and level.

### **3.10 CLEANING**

- A. Clean exposed surfaces to remove splatters and restore finish.

### **3.11 CLOSEOUT ACTIVITIES**

- A. Training Visit
  - 1. Lighting Control System Manufacturer shall provide (1) 2-hour training sessions on-site for personnel.

**END OF SECTION 260943**

**SECTION 262416**  
**PANELBOARDS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Branch circuit panelboards

**1.02 RELATED SECTIONS**

- A. Specification Section 260526 - Grounding and Bonding for Electrical System
- B. Specification Section 260553 - Identification for Electrical Systems

**1.03 REFERENCES**

- A. NECA Standard of Installation (published by the National Electrical Contractors Association)
- B. NEMA AB1 - Molded Case Circuit Breakers
- C. NEMA ICS 2 - Industrial Control Devices, Controllers and Assemblies
- D. NEMA KS1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
- E. NEMA PB 1 - Panelboards
- F. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less
- G. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment (published by the International Electrical Testing Association)
- H. NFPA 70 - National Electrical Code

**1.04 SUBMITTALS**

- A. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- B. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- C. Record actual locations of panelboards and record actual circuiting arrangements in project record documents.
- D. Maintenance Data: Include spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.
- E. It is the electrical contractors and suppliers responsibility to confirm the appropriate size and quantity of circuit breakers in the submitted panelboards with the information shown on the plan sheets, including the panelboard schedule, and the mechanical contractor prior to releasing the panelboards for construction.

**1.05 QUALIFICATIONS**

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

**1.06 REGULATORY REQUIREMENTS**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

**1.07 RATINGS**

- A. Definitions:

1. Fully rated equipment shall be defined as equipment where all devices in that equipment shall carry a minimum of the AIC rating that is specified. The distribution panels, panelboards, and load centers for this project shall be fully rated unless otherwise specifically noted in the Drawings or Specifications.

### **1.08 MAINTENANCE MATERIALS**

- A. Furnish two of each panelboard key.

## **PART 2 PRODUCTS**

### **2.01 BRANCH CIRCUIT PANELBOARDS**

- A. Manufacturers:
  1. Square D. #NQ or NF
  2. ABB
  3. Eaton (Cutler-Hammer)
  4. Siemens
  5. Engineer approved equal.
- B. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.
- C. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.
- D. Minimum Integrated Short Circuit Rating: See schedule on the drawings.
- E. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers with common trip handle for all poles, listed as type #SWD for lighting circuits, type #HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers where scheduled. Provide arc fault circuit breakers in all dwelling units as required by NEC Code. Do NOT use tandem circuit breakers. Handle ties to make multiple pole breakers are NOT permitted.
- F. Current Limiting Molded Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100,000 symmetrical amperes, let through current and energy level less than permitted for same size Class RK-5 fuse. Handle ties to make multiple pole breakers are NOT permitted.
- G. Enclosure: NEMA PB 1, type #1.
- H. Cabinet box is to be 6" D x 20" W for 240 volt and less panelboards.
- I. Cabinet Front: Flush or surface cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.
- J. Door: Provide hinged door-in-door trim.
- K. Surge Protection Devices shall comply with Specification Section 26 4313.
- L. All panelboards 225 amp or less, are to have either intermediate supports on the bus bars to prevent deflection, or are required to have 800 amp/square inch bus bars if the bus bars are only supported at each end of the bus.
- M. Each section of multi-section panels shall have the same dimensions.
- N. If the system voltage is less than 150V and the equipment is neither grounded nor double insulated, a Class A GFCI with 4 to 6 mA trip current is required per the NEC. However, if the equipment is considered "specialty" or "special-purpose" and either grounded or double-insulated, a Class C GFCI with 20 mA trip level shall be acceptable.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install panelboards in accordance with NEMA PB 1.1 and the NECA "Standard of Installation."
- B. Install panelboards plumb. Install recessed panelboards flush with wall finishes.

- C. Height is to be six feet (6') to top of the panelboard. Install panelboards taller than six feet (6') with bottom no more than four inch (4") above floor.
- D. Provide filler plates for unused spaces in panelboards.
- E. Provide typed circuit directory for each branch circuit panelboard. Use actual room numbers and not plan room numbers. Coordinate with owner. Revise directory to reflect circuiting changes required to balance phase loads. Typed circuit directories shall be completed in Microsoft Excel. The electrical contractor shall submit a CD with all directories included.
- F. Provide engraved plastic nameplates under the provisions of Specification Section 260553 - Identification for Electrical Systems.
- G. Ground and bond the panelboard enclosure.
- H. Any panel field modifications and associated means and methods shall be approved by the Authority Having Jurisdiction and the equipment manufacturer. Any costs associated shall be included in the bid.
- I. It shall be the responsibility of the electrical contractor to verify all wire sizes with existing and new circuit breakers prior to ordering and installing so that specified wire will properly fit into the corresponding circuit breaker.
- J. Verify lug size of electrical equipment and mechanical equipment is properly sized to receive specified conductor size. Refer to one-line and the conduit/conductor chart for additional information.

### **3.02 FIELD QUALITY CONTROL**

- A. Inspect in accordance with NETA ATS.
- B. Perform inspections listed in NETA ATS.

### **3.03 ADJUSTING**

- A. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20% of each other. Maintain proper phasing for multi-wire branch circuits.

### **3.04 COORDINATION STUDY**

- A. Manufacturer shall provide all necessary circuit breaker coordination studies to determine required settings of their equipment.
- B. Contractor shall coordinate any breaker settings and adjust per the manufacturers recommended adjustable breaker settings.

**END OF SECTION 262416**



**SECTION 262701**  
**UTILITY SERVICE ENTRANCE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Metering instrument transformer cabinets
- B. Meter bases
- C. Transformer install conduits and fittings

**1.02 RELATED SECTIONS**

- A. Specification Section 261300 - Distribution Switchgear

**1.03 REFERENCES**

- A. NECA Standard of Installation National Electrical Contractors Association
- B. NFPA 70 - National Electrical Code
- C. OSHA (shoring/digging guidelines)
- D. NESC (rules on proximity to other buried utilities)

**1.04 SYSTEM DESCRIPTION**

- A. System Characteristics: 120/240 volts, single phase, three-wire, 60 Hertz.
- B. Service Entrance: 120/240V, 200A

**1.05 SUBMITTALS**

- A. Product Data: Provide ratings and dimensions of Instrument Transformer Cabinets and meter bases.
- B. Submit local utility company prepared drawings.

**1.06 QUALITY ASSURANCE**

- A. Utility Company: Eastern Iowa L & P Rec
- B. Perform work in accordance with local utility company's written requirements.
- C. Obtain permission from utility company personnel before installation of any of the following: conduit, sweeps, metering equipment/cabinetry, equipment pads, forms for concrete pads
- D. Maintain one copy of each document on site.

**1.07 REGULATORY REQUIREMENTS**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

**1.08 PRE-INSTALLATION MEETING**

- A. Convene one week prior to commencing work of this section. Review service entrance requirements and details with local utility company's representative.

**1.09 FIELD MEASUREMENTS**

- A. if available verify that field measurements are as indicated on the utility company's (or AHJ as applicable) drawings.
- B. Provide as built of installation approved by utility, AHJ, or owner.

**PART 2 PRODUCTS**

**2.01 METERING INSTRUMENT TRANSFORMER CABINETS**

- A. Description: Sheet metal cabinet with hinged door, conforming to utility company requirements with provisions for locking and sealing.

- B. Size: As required by the local utility company.

## **2.02 METER BASES**

- A. The electrical contractor shall furnish meter base and meter socket with test switch in accordance with utility company requirements.
- B. Description: Meter base rated 320 amperes continuous duty. Refer to Eastern Iowa L&P REC service manual for additional requirements.

## **2.03 TRANSFORMER INSTALL CONDUITS AND FITTINGS**

- A. Description: Provide metering equipment and other distribution equipment. Provide all fittings and sweeps needed for installation. Extend conduits to location approved in writing by utility company. Coordinate number of conduits with utility company. Install conduit at greatest depth required by NESC or utility. Install pull strings as required by utility company.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Arrange with utility company to obtain permanent electric service to the project.

### **3.02 UTILITY FEES**

- A. The contractor is required to assist the owner in the preparation of all utility company rebate forms that deal with equipment furnished and/or installed by this contractor.

### **3.03 INSTALLATION**

- A. Install weather head, meter socket with test switch and meter base as required by utility company. Provide primary conductor conduit for utility company per their requirements. Verify with utility prior to bidding. Refer to electrical one-line diagram for additional information.
- B. EC shall furnish the following as applicable: meter pedestal, meter socket, weatherhead, bypass, test switches, other meter mounting equipment, wall attachments, and/or standalone metering structure. Coordinate equipment requirements with utility company.

**END OF SECTION 262701**

**SECTION 262726**  
**WIRING DEVICES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wall switches
- B. Duplex receptacles
- C. Ground fault circuit interrupting receptacles
- D. USB charge duplex receptacles
- E. Simplex receptacles
- F. Wall plates
- G. Floor boxes and service fittings

**1.02 RELATED REQUIREMENTS**

- A. Specification Section 26 0533 - Raceway and Boxes for Electrical Systems
- B. Specification Section 26 0943 - Digital Lighting Control Systems

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2010
- B. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2005)
- C. NEMA WD 6 - Wiring Device -- Dimensional Requirements; National Electrical Manufacturers Association; 2002 (R 2008)
- D. NFPA 70 - National Electrical Code; National Fire Protection Association; 2011
- E. UL Standard 943 - Standard for Safety for Ground-Fault Circuit Interrupters (GFCIs)

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- C. Manufacturer's Installation Instructions.
  - 1. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.
  - 2. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 6000 - Product Requirements, for additional provisions.
  - 2. Extra Wall Plates: One of each style, size, and finish.

**1.05 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.



## **PART 2 PRODUCTS**

### **2.01 WALL SWITCHES**

- A. Description:
1. Heavy Duty, AC only general-use snap switch, complying with NEMA WD 6 and WD 1.
  2. Body and Handle: Impact-resistant plastic with toggle handle. Auto-grounding strap.
  3. Ratings: Match branch circuit and load characteristics. Default rating is 20A, 120/277V, 1HP.
  4. Wiring: Back and side wire connections. Accepts #14-#10 AWG solid and stranded copper conductors.
  5. Provide #12 AWG solid pigtails at each device. Splice to building wire within outlet box.
  6. Color: Selected during submittal phase. Provide color chart upon request.
- B. Types:
1. Toggle Switches
    - a. Approved Manufacturers and Models:
      - 1) Pass & Seymour #PS20AC
      - 2) Cooper #2221
      - 3) Hubbell #1221
      - 4) Leviton #1221-2
    - b. Description: Single pole, double pole, 3-way, and 4-way toggle switches as indicated on plans.

### **2.02 DUPLEX RECEPTACLES**

- A. Description
1. Style: Hard use specification grade
  2. Device Body: Impact resistant plastic with impact-resistant nylon face. Auto-grounding strap.
  3. Configuration: NEMA WD 6, type as specified and indicated.
  4. Rating: Match branch circuit and load characteristics. Default rating is 5-20R, 125V, 20A.
  5. Standards: Receptacles comply with NEMA WD 6 and WD 1.
  6. Wiring: Back and side wire connections. Accepts #14-#10 AWG solid and stranded copper conductors.
  7. Provide #12 AWG solid pigtails at each device. Splice to building wire within outlet box.
  8. Color: Selected during submittal phase. Provide color chart upon request.
- B. Types
1. Duplex Receptacles
    - a. Manufacturers:
      - 1) Pass & Seymour #5362
      - 2) Cooper #5362C
      - 3) Hubbell #5362
      - 4) Leviton #5362-S
    - b. Description: Traditional style, hard use specification grade duplex receptacle with wraparound grounding/mounting strap.
  2. Weather-Resistant Receptacles
    - a. Manufacturers:
      - 1) Pass & Seymour #2097TRWR
      - 2) Cooper #WRSGF20
      - 3) Hubbell #GFTWRST20
      - 4) Leviton #GFWT2
    - b. Description: UL listed weather-resistant receptacle.
    - c. Provide weather-resistant receptacles for all receptacles located in wet and damp locations as described in NEC Article 406.

### 2.03 GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLES

- A. Receptacles: Complying with NEMA WD 6 and WD 1. Class A GFCI rated.
  - 1. Style: Hard use specification grade
  - 2. Device Body: Impact resistant plastic with impact-resistant nylon face. Auto-grounding strap.
  - 3. Configuration: NEMA WD 6, type as specified and indicated.
  - 4. Rating: Match branch circuit and load characteristics. Default rating is 5-20R, 125V, 20A.
  - 5. Standards: Receptacles comply with NEMA WD 6 and WD 1.
  - 6. Wiring: Back and side wire connections. Accepts #14-#10 AWG solid and stranded copper conductors.
  - 7. Provide #12 AWG solid pigtails at each device. Splice to building wire within outlet box.
  - 8. Color: Selected during submittal phase. Provide color chart upon request.
- B. Types
  - 1. GFCI Duplex Receptacles
    - a. Manufacturers:
      - 1) Pass & Seymour #2097
      - 2) Cooper SGF20
      - 3) Hubbell GFRST20
      - 4) Leviton GFNT2
    - b. Description: Specification grade duplex GFCI receptacle.
    - c. Receptacles noted as "GFI" on plans.
  - 2. GFCI Tamper Resistant Receptacles
    - a. Manufacturers:
      - 1) Pass & Seymour 2097TR
      - 2) Cooper TRSGF20
      - 3) Hubbell GFTRST20
      - 4) Leviton GFTR2
    - b. Description: Specification grade tamper-resistant duplex GFCI receptacle.
    - c. Receptacles in all areas as noted in NEC Article 406.
    - d. Receptacles noted as "GFI" on plans.

### 2.04 SIMPLEX RECEPTACLES

- A. Description
  - 1. Style: Hard use specification grade
  - 2. Device Body: Impact resistant plastic with impact-resistant nylon face. Auto-grounding strap.
  - 3. Configuration: NEMA WD 6, type as specified and indicated.
  - 4. Rating: Match branch circuit and load characteristics. Default rating is 5-20R, 125V, 20A.
  - 5. Standards: Receptacles comply with NEMA WD 6 and WD 1.
  - 6. Wiring: Back and side wire connections. Accepts #14-#10 AWG solid and stranded copper conductors.
  - 7. Provide #12 AWG solid pigtails at each device. Splice to building wire within outlet box.
  - 8. Color: Selected during submittal phase. Provide color chart upon request.

### 2.05 WALL PLATES

- A. Standard Cover Plates:
  - 1. Type 302 stainless steel cover plates. Cover plate style to be confirmed during submittal phase.
  - 2. Basis of Design: Pass & Seymour #SS (Metal), to be confirmed during submittal phase.
  - 3. Provide coverplate for all devices and provide multiple gang plates where required.
- B. Jumbo Cover Plates:

1. Type 302 stainless steel oversize cover plates. Cover plate style to be confirmed during submittal phase.
  2. Basis of Design: Pass & Seymour #SSO (Metal) to be confirmed during submittal phase.
  3. Provide coverplate for all devices and provide multiple gang plates where required.
  4. Provide oversize plates on all masonry rough-ins. Verify with architect prior to work being performed.
- C. Weatherproof Box & Cover:
1. Basis of Design: Pass & Seymour #WIUC10.
    - a. Description: Heavy-duty polycarbonate NEMA 3R "While-In-Use" weatherproof box and cover. Installed horizontally.
    - b. Complies with NEC Article 406 requirements for wet location covers.
    - c. Provide with plate kits as required.
    - d. Provide multi-gang or deep cover configurations as required for application.
    - e. Cover shall be capable of accepting a standard size padlock.
    - f. Color shall be gray, to be confirmed during submittal phase.
    - g. Indicated by "WP" on plans.

## **2.06 FLOOR BOXES AND SERVICE FITTINGS**

- A. See schedule on drawings.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that outlet and switch boxes are installed at proper height.
- B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify that floor boxes are adjusted properly.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

### **3.02 PREPARATION**

- A. Provide extension rings as needed to bring outlet and switch boxes flush with finished surface.
- B. Clean debris from outlet and switch boxes prior to device installation.

### **3.03 INSTALLATION**

- A. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- E. Install receptacles with grounding pole on top.
- F. Connect wiring device grounding terminal to outlet box with bonding jumper.
- G. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- H. Connect wiring devices by wrapping conductor around screw terminal.
- I. Use oversize plates for outlets installed in masonry walls.
- J. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- K. The electrical contractor shall verify floor finish and location before ordering floor devices.
- L. The feeding of receptacles downstream of GFI receptacles for protection in lieu of providing multiple GFI receptacles is NOT allowed.

**3.04 INTERFACE WITH OTHER PRODUCTS**

- A. Coordinate locations of outlet boxes provided under Section 26 0533 to obtain mounting heights specified.
- B. Install wall switches 48 inches above finished floor.
- C. Install convenience receptacle 18 inches above finished floor.
- D. Install above-counter convenience receptacle 6 inches above counter.
- E. Install telephone jack 18 inches above finished floor.
- F. In masonry walls, switches and receptacle heights shall be adjusted as required such that outlets are at nearest mortar joint to specified height.
- G. Coordinate the installation of wiring devices with underfloor duct service fittings provided under Section 26 0543.

**3.05 FIELD QUALITY CONTROL**

- A. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.
- B. Inspect each wiring device for defects.
- C. Operate each wall switch with circuit energized and verify proper operation.
- D. Verify that each receptacle device is energized.
- E. Test each receptacle device for proper polarity.
- F. Test each GFCI receptacle device for proper operation.

**3.06 ADJUSTING**

- A. Adjust devices and wall plates to be flush and level.

**3.07 CLEANING**

- A. Clean exposed surfaces to remove splatters and restore finish.

**END OF SECTION 262726**



**SECTION 262816**  
**ENCLOSED STARTERS AND SWITCHES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Safety switches
- B. Motor-Rated starters and switches

**1.02 RELATED REQUIREMENTS**

- A. Specification Section 26 0529 - Hangers and Supports for Electrical Systems
- B. Specification Section 26 0553 - Identification for Electrical Systems
- C. Specification Section 26 2813 - Fuses

**1.03 REFERENCE STANDARDS**

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association
- B. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association
- C. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association
- D. NFPA 70 - National Electrical Code; National Fire Protection Association
- E. NECA - Standard of Installation (published by the National Electrical Contractors Association)

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide switch ratings and enclosure dimensions.
- C. Project Record Documents: Record actual locations of enclosed switches.

**1.05 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience and with service facilities within 100 miles of Project.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**PART 2 PRODUCTS**

**2.01 SAFETY SWITCHES**

- A. Manufacturers
  - 1. Square D
  - 2. General Electric
  - 3. Eaton
  - 4. Siemens
  - 5. Engineer approved equal.
  - 6. No engineer approved equal.
- B. Heavy duty safety switches shall be used for all motor loads over 1 HP and all non-motor loads 20 amps and greater.
  - 1. Fusible Switch Assemblies: NEMA KS 1, Type HD enclosed load interrupter knife switch.
    - a. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
    - b. Handle lockable in OFF position.

- c. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses, with rejection clips designed to permit installation of Class R fuses only.
- d. Indicated as a disconnect switch with a "F" on the drawings.
2. Nonfusible Switch Assemblies: NEMA KS 1, Type HD enclosed load interrupter knife switch.
  - a. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
  - b. Handle lockable in OFF position.
3. Enclosures: NEMA KS 1.
  - a. Interior Dry Locations: Type 1 .
  - b. Exterior Locations: Type 3R.
  - c. Enclosures shall be provided with a method of opening the cover without opening the switch.
4. Enclosure shall include a grounding bar.

## **2.02 MOTOR-RATED STARTERS AND SWITCHES**

- A. Manufacturers
  1. Square D
  2. General Electric
  3. Cutler-Hammer
  4. Siemens
  5. Cooper-Bussmann
  6. Engineer approved equal.
- B. Motor-rated starters and switches may be used for all motor loads 1 HP and less and all non-motor loads under 20 amps.
  1. Motor-Rated Switch with Fuseholder
    - a. Basis of Design: Cooper-Bussmann "STY".
    - b. Description: Motor-rated toggle switch disconnecting means with plug fuseholder.
    - c. Fuseholder: Designed to accommodate plug fuses. Provide fuse sized per NEC 430.
    - d. For use with single-pole motors only.
  2. Nonfusible Motor-Rated Starter
    - a. Basis of Design: Square D "Type F".
    - b. Description: Fractional horsepower manual starter with melting alloy type thermal overload relay.
    - c. Handle lockable in OFF position.
    - d. Current rating: 16A
    - e. For use with single-phase motors only.
    - f. Provide and install thermal units sized per NEC 430.
  3. Nonfusible Motor-Rated Switch
    - a. Basis of Design: Square D "Type K".
    - b. Description: Fractional horsepower manual switch with melting alloy type thermal overload relay.
    - c. Handle lockable in OFF position.
    - d. Current rating: 30A
    - e. For use with single or three phase motors.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with NECA "Standard of Installation."
- B. Install in accordance with manufacturer's instructions.
- C. Install plumb and provide in accordance with Specification Section 26 0529 - Hangers and Supports for Electrical Systems.

- D. Height to be five foot (5') to operating handle.
- E. Install fuses in fusible disconnect switches. Fuses shall not be installed until equipment is ready to be energized.
- F. Provide one set of spare fuses of each size and type.
- G. Provide adhesive label with white letters on black background for associated equipment.
- H. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

**3.02 FIELD QUALITY CONTROL**

- A. Perform field inspection in accordance with Section 01 4000.
- B. Inspect and test in accordance with NETA STD ATS, except Section 4.
- C. Perform inspections and tests listed in NETA STD ATS, Section 7.5.1.2.

**END OF SECTION 262816**





**SECTION 265100**  
**INTERIOR LIGHTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. LED Drivers
- B. Light Emitting Diodes (LEDs)

**1.02 REFERENCES**

- A. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006
- B. NECA/IESNA 500 - Recommended Practice for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association
- C. NECA/IESNA 502 - Recommended Practice for Installing Industrial Lighting Systems; National Electrical Contractors Association
- D. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association
- E. NFPA 70 - National Electrical Code; National Fire Protection Association
- F. NFPA 101 - Life Safety Code
- G. IESNA LM-79-08 - Approved Method for the Electrical and Photometric Measurement of Solid-State Lighting Products
- H. IESNA LM-80-08 - Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- I. IESNA TM-21-11 - Projecting Long Term Lumen Maintenance of LED Light Sources
- J. EU Directive 2002/95/EC - Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS), as amended by directive 2005/618/EC

**1.03 SUBMITTALS**

- A. Provide cut sheet indicating dimensions and components for each luminaire.
- B. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- C. Submit manufacturer's operation and maintenance instructions for each product.
- D. All lighting submittals must be on Local Authorized Manufacturer Representative's letterhead and contain Project Name and Location.
- E. Closeout: Provide list of Extra Materials for owner to verify and sign for acknowledgement of receiving.

**1.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70 and NFPA 101.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

**1.05 REGULATORY REQUIREMENTS**

- A. Conform to requirements of NFPA 70 and 101
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

- C. Products with Light Emitting Diodes:
  - 1. Fixtures shall comply with LM-79-08: Electrical and Photometric Measurements of Solid-State Lighting Products.
  - 2. Interior fixture diode arrays shall maintain +/-100 degrees Kelvin (K); exterior fixture diode arrays shall maintain +/- 500 K color temperature range through the life of the fixture.
  - 3. Diode arrays shall be wired so that if one diode fails, at least 90% of the remaining diodes will operate.

## **PART 2 PRODUCTS**

### **2.01 LED DRIVERS:**

- A. Manufacturers must be in business a minimum of (5) years.
- B. Drivers shall be provided with light emitting diodes as a modular replaceable system. The system shall be fully designed and tested for operation throughout warranted period.
- C. Driver shall be Underwriters Laboratories (UL) listed, Class 2 Outdoor recognized.
- D. Driver shall be suitable for damp locations.
- E. Driver shall operate from -20 to 60 deg C.
- F. Refer to fixture schedule on drawings for additional requirements.
- G. Driver shall operate from 50 to 60 Hz input source of 120 V, 208 V, 240V, 277 V and/or 480 V, as required in plans, with sustained variations of +/-10% (voltage and frequency) with no damage to the driver.
- H. Driver output shall be regulated to +/- 5% across published load range.
- I. Driver shall have an "A" sound rating.
- J. Driver shall have a power factor greater than 0.9.
- K. Driver input current shall have Total Harmonic Distortion (THD) of less than +/-20% at all operating voltages.
- L. Driver shall tolerate sustained open circuit and short circuit output conditions without damage and without need for external fuses or trip devices.
- M. Driver shall carry a five-year warranty from the date of manufacture against defects in material or workmanship, including replacement for operation at a maximum case temperature of 90 deg C.
- N. Driver shall have an efficiency greater than or equal to 85%.
- O. Driver shall comply with Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 15, Non-consumer (Class A) for EMI/RFI (conductive and radiated).
- P. Driver shall not contain any Polychlorinated Biphenyl (PCB).

### **2.02 LIGHT EMITTING DIODES (LEDS):**

- A. Manufacturers must be in business for a minimum of (5) years.
- B. Light Emitting Diodes shall be provided with a driver as a modular replaceable system. The system shall be fully designed and tested for operation throughout warranted period.
- C. Diode arrays shall maintain +/-100K color temperature through the life of the fixture.
- D. Diodes shall have a minimum color rendering index of 80.
- E. Diodes and associate circuitry shall be RoHS compliant.
- F. Diodes shall be photometrically tested for compliance with IESNA LM-80-08, with projections calculated in accordance with IESNA TM-21-11.
- G. Diode arrays shall maintain a minimum 70% lumen output through an average operating life of 50,000 hours.

- H. Diodes and associated printed circuit boards shall be RoHS compliant.
- I. Refer to Lighting Fixture Schedule for color temperature requirements.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Furnish products as specified in schedule on the drawings.
- C. Install suspended luminaires and exit signs using pendants supported from swivel hangers. Provide pendant length required suspending luminaire at indicated height.
- D. Locate recessed ceiling luminaires as indicated on reflected ceiling drawing and electrical lighting drawings.
- E. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- F. Install recessed luminaires to permit removal from below.
- G. Install recessed luminaires using accessories and fire stopping materials to meet regulatory requirements for fire rating.
- H. Install clips to secure recessed grid-supported luminaires in place.
- I. Install recessed can luminaires to fit in ceiling. Provide all necessary trim ring extenders or other accessories for proper installation of luminaire in ceiling.
- J. Install wall mounted luminaires, emergency lighting units and exit signs at height as scheduled.
- K. Install accessories furnished with each luminaire.
- L. Fixture whips utilizing THHN/THWN-2 wire in flexible metal conduit shall be used to connect all luminaires, emergency lights, and exit signs. Minimum wire size for all fixture whips shall be 14 AWG. Fixture whips shall be wired directly from the luminaire to an accessible junction box. Fixture to fixture whips are not allowed. Maximum length for any fixture whip shall be 6'.
- M. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- N. Bond products and metal accessories to the branch circuit equipment grounding conductor.
- O. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure. Provide auxiliary members spanning ceiling grid members to support surface mounted luminaires.
- P. Support luminaires larger than 2' x 4' size independent of ceiling framing.

#### **3.02 FIELD QUALITY CONTROL**

- A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

#### **3.03 ADJUSTING**

- A. Aim and adjust luminaires as directed.
- B. Position exit sign directional arrows as indicated.

#### **3.04 WARRANTIES**

- A. All warranties shall remain as an agreement between the installing contractor and the manufacturer. No third parties shall be involved with warranty repairs or replacements of installed products without the written consent of the installing contractor and the owner or their representative.
- B. Labor for warranty repairs shall be billed by the contractor directly to the manufacturer or distributor during the duration of the labor warranty on the originally installed products. Labor

work required on warranted parts, but outside of the 1-year labor warranty shall be the responsibility of the owner.

**3.05 CLEANING**

- A. Clean all electrical parts to remove all of the conductive and deleterious materials.
- B. Remove dirt and debris from enclosures.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

**3.06 SCHEDULES**

- A. See the drawings.

**END OF SECTION 265100**

**SECTION 270050**  
**BASIC COMMUNICATIONS REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Basic Communications Requirements specifically applicable to Electrical Division Specification Sections.
- B. Division 27 Specification requirements also include, by reference, all Division 00 and 01 specification sections. This contractor is responsible to review these specification sections. Requirements of these specification sections are included as a part of this contract.

**1.02 WORK BY OWNER**

- A. The Following Work or Sub Contracts Will Be Furnished and Installed (OFOI) By The Owner:
  - 1. Telephone system equipment and installation.
  - 2. Computer network equipment and installation.
  - 3. Computer workstation equipment and installation.
- B. The Following Products Will Be Furnished By The Owner Bidding Contractor Shall Install (OFCI):
  - 1. Audio visual system hardware.
  - 2. Wireless access point (WAP) hardware (bidding contractor shall install).
  - 3. Televisions/Monitors (Contractor Installed)
- C. Owner's Responsibility:
  - 1. Arrange for and deliver owner reviewed shop drawings, product data and samples to contractor.
  - 2. Arrange and pay for product delivery to site.
  - 3. On delivery, inspect products jointly with contractor.
  - 4. Submit claims for transportation damage and replace damaged, defective or deficient items.
- D. Contractor's Responsibility:
  - 1. Review owner reviewed shop drawings, product data and samples.
  - 2. Review and unload owner purchased materials at site, inspect for completeness and/or damage jointly with the owner.
  - 3. Handle, store, install and finish products. Install electrical wiring and devices.
  - 4. Repair and/or replace items damaged after receipt.

**1.03 OWNER OCCUPANCY**

- A. The owner will occupy the premises during the construction period.
- B. Limit use of site and premises to allow owner occupancy.
- C. Cooperate with the owner to minimize conflict and to facilitate owner's operations.
- D. Schedule the work to accommodate this requirement.

**1.04 REGULATORY REQUIREMENTS**

- A. This contractor shall give proper authorities all requisite notices relating to work in their charge, obtain official permits, licenses for temporary construction and pay proper fees for it.
- B. This contractor is to be solely answerable for and shall promptly make good all damage, injury or delay to other contractors, to neighboring premises or to persons or property of the public by themselves, by their employees or through any operation under their charge, whether in the contract or extra work.
- C. No attempt has been made to reproduce in these specifications any of the rules or regulations contained in city, state or federal ordinances and codes pertaining to the work covered by these specifications that the contractor be thoroughly familiar with all such ordinances and codes.

- D. The fact that said various rules, regulations and ordinances are not repeated in this specification does not relieve the contractor of the responsibility of making the entire installation in accordance with the requirement of those authorities having jurisdiction.
- E. All work shall comply with the applicable recommendations of:
  - 1. National Board of Fire Underwriters
  - 2. ANSI-NFPA 70 National Electrical Code
  - 3. National Fire Protection Association (NFPA)
  - 4. Occupations Safety and Health Act (OSHA)
  - 5. IBC Building Code (current) and any current applicable city building and or electrical codes.
  - 6. Fire Protection: Conform to International Fire Code (IFC) and NFPA
  - 7. International Energy Conservation Code (IECC)
- F. Obtain permits and request inspections from authority having jurisdiction.
- G. Conform to latest approved versions of codes.

#### **1.05 PROJECT/SITE CONDITIONS**

- A. Install work in locations shown on drawings unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of owner and architect/engineer before proceeding.
- C. This contractor shall, before submitting their bid, visit the site of the project to familiarize themselves with locations and conditions affecting their work.
- D. It is the intent of this specification that the contractor furnishes all labor and material required to complete the installation as outlined in the drawings and specifications. No additions to the contract price shall be allowed due to the failure of this contractor to properly evaluate the effect of existing conditions on the work to be done under this contract.
- E. Whenever renovation or remodeling or relocation of existing equipment is included in the contract, it is imperative that all locations of existing wiring conduits, electrical panels, equipment, services and grades be noted on the job site before bid is submitted and that all elevations and grades be verified before roughing in new work.
- F. This contractor shall provide holes as necessary for the installation of their work and in accordance with materials other than the structure.

#### **1.06 SEQUENCING AND SCHEDULING**

- A. This contractor shall arrange their work in order that it progresses along with the general construction of the building.
- B. This contractor shall be kept informed as to the work of other trades engaged in this project and shall execute their work in such a manner so as not to delay or interfere with progress of other contractors.
- C. Where space for electrical lines and conduit is limited, it is imperative that all such trades coordinate their work so as to ensure concealment in space provided. Where conflict exists, the design team shall decide priority of space. If work is not properly coordinated, the design team may require removal and relocation of work without additional compensation.

#### **1.07 GUARANTEE**

- A. This contractor shall guarantee all of the apparatus, materials, equipment furnished and labor installed under this contract for a period of one year after date of final acceptance, unless a longer period is specified.
- B. Neither final certificate of payment nor any provisions in the contract documents nor partial or complete occupancy of premises by owner shall constitute an acceptance for work not done in accordance with contract documents or relieve the contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.

- C. Should any defects arise as the result of defective workmanship or material within the guarantee period set forth, this contractor shall make the necessary correction at their own expense.

#### **1.08 ENGINEER APPROVED EQUAL PRODUCTS**

- A. When the engineer, at the request of the interested parties, including the contractor, supplier and manufacturer approved "engineer approved equal" products for this project, such products are approved on the assumption that they will equal or exceed the performance of the products specified.
- B. If such products do not do so after being installed on this project, this contractor shall replace or modify the particular product as necessary to equal the performance of the products specified at no expense to the owner, architect or engineer.
- C. Request for "engineer approved equal" products shall be received by the architect/engineer prior to the last addendum being issued. Requests for substitutions received after this date will not be considered. Substitution requests shall clearly state which products are being considered for substitution. Substitution requests shall include all pertinent product information needed to evaluate the substitution as an "equal".
- D. Similar products shall be all of the same manufacturer and style. There is no exception to this unless prior approval has been granted from engineer.

#### **1.09 OWNER'S RIGHT OF SALVAGE**

- A. Before beginning construction, the contractor shall check and verify with the owner each item of existing equipment that must be removed.
- B. The owner will designate which items of material or equipment not reused that he may wish to keep. The contractor shall then remove these items with care and store in a location designated by the owner for the owner's disposal.
- C. All other items of equipment to be removed and not specified for reuse in new construction or reserved by the owner for their use shall become the property of the contractor and shall be removed from the site.

#### **1.10 TELECOMMUNICATIONS UTILITY COMPANY**

- A. The contractor is required to assist in coordination of final telecommunications utility locations that will serve the building with telephone, internet and cable television services. See 26 0050 for additional information.

#### **1.11 PROTECTION AND MAINTENANCE**

- A. The work covered by these drawings and specifications involves all work in the existing building.
- B. Where necessary to connect to any existing utility service, this electrical contractor shall contact the owner and shall coordinate any building service connection with the owner so that normal operation to the building is disrupted as little as possible.
- C. Any work to be done in existing structures shall be coordinated with the owner and arrangements made so that traffic flow may be maintained and areas finished where possible before other areas are begun.
- D. This contractor shall protect existing equipment in finished areas from dirt, dust, and damage as a result of their work.
- E. Coordinate protection requirements with department heads before beginning construction.
- F. Protect any building openings from unauthorized entry. Coordinate with owner where building entry must be controlled.

#### **1.12 DEMOLITION**

- A. This contractor shall be responsible for the demolition and removal of all existing system elements within the project area except as follows:



1. Elements shown on the drawings as "existing to remain and/or to be reused".
  2. Elements serving adjacent areas.
  3. Elements required for the support of the newly remodeled areas.
  4. All elements to be removed are subject to the Owner's Right of Salvage.
- B. Preserve services to the existing facility. Extend/reroute/reconnect the existing systems as required providing for the continued function of these systems.

#### **1.13 CUTTING AND PATCHING**

- A. This contractor shall do all cutting and patching necessary for the installation of their work in all existing and new buildings unless otherwise noted.
- B. In areas where the integrity of fire separation assembly/wall is compromised by the work, this contractor shall be responsible to patch and/or seal openings as necessary to maintain and/or return fire separation to rating as required by applicable codes.
- C. This contractor shall do all cutting and patching required for their work beyond the remodeled areas unless otherwise noted. All finish work shall include patching to match existing adjacent surfaces. Painting shall be by others.

#### **1.14 CLEANING AND RUBBISH**

- A. This contractor, upon completion of their work, shall remove all rubbish and debris resulting from their operation and shall remove it from site at their own expense.
- B. As far as their work is concerned, all equipment shall be cleaned and the premises left in first class condition.
- C. This contractor shall maintain the work area each day to prevent hazardous accumulation of debris from their work.

#### **1.15 SEALING AND PENETRATION**

- A. Clearance around the piping passing through fire or smoke rated construction shall be sealed to maintain the rated integrity of the construction (1 hr. 2 hrs. etc.). One and two-hour rated assemblies are to be patched on both sides of the assembly.
- B. This contractor shall verify rating and location of all such construction with the architectural drawings and seal all penetrations.
- C. Manufacturer offering products to comply with the requirements include the following:
1. Dow Corning "Silicone RTV Foam"
  2. 3-M Corporation "Fire Barrier Caulk and Putty"
  3. Thomas and Betts "Flame Safe Fire Stop System"
  4. Specified Technologies "EZ-Path"
- D. Installation of these products are to be in strict accordance with the manufacturer's recommendations and architectural specifications, details or equivalent fire stopping general specification section.
- E. This contractor shall submit shop drawings showing approved sealing assemblies to be utilized on this project.

#### **1.16 HAZARDOUS MATERIALS**

- A. If the contractor stores any hazardous solvents or other materials on the site, they shall obtain copies of the safety data sheets for the materials and post them at the site. The contractor shall inform the owner and all employed of any potential exposure to this material.
- B. At no time shall any product containing asbestos be incorporated into the work.
1. If asbestos materials are encountered, report to the owner. The owner will be responsible for asbestos removal.

### **1.17 RECORD DRAWINGS**

- A. This contractor shall provide (at the conclusion of the project) one clean, non-torn, neat and legible "as-built" set of drawings to the owner. These drawings shall show the routing of conduit, wiring and equipment drawn in at scaled locations. All cabling, devices, and endpoints shall be labeled and conform to head end programming and system drawings. All dimensions indicated shall be referenced to a column line. A set of construction blueprints will be furnished for this work.
- B. All system head-end equipment and devices shall be shown on the "as-built" drawings.
- C. Refer to Architectural Specification Sections for additional requirements.
- D. This contractor shall update these drawings during the project at least every week.

### **1.18 ALTERNATES**

- A. Refer to description of alternate bids under General Specification Sections.

### **1.19 REVIEW OF MATERIALS**

- A. This contractor shall submit to the engineer, for review one (1) electronic copy giving a complete list of materials, fixtures, devices and panels he proposes to furnish. The brochure shall contain complete information as to the model of equipment, type, size, capacities, dimensions, and illustration. An electronic copy shall be kept on the job at all times.
- B. Checking of submittal drawings by the engineer does not relieve the contractor of the responsibility for the accuracy of such drawings and for their conformity to drawings and specifications unless he notifies engineer, in writing, of such deviation at time such drawings are furnished.
- C. All submittals shall have the date marked on them when the contractor receives them from the supplier. Submittals shall be submitted through the contractor and shall not come direct from the supplier to the architect or engineer.
- D. This contractor shall mark the date and sign each set signifying that the contractor has checked each of them in their entirety before submitting to the engineer. Submittals that are not dated and signed by the contractor will not be accepted, or checked and will be marked "resubmit" and sent back to the contractor.

### **1.20 TEST OF SYSTEMS**

- A. This contractor, before concealed, shall test all systems installed under this contract as called for in these specifications and as required by local codes. Tests shall be made in the presence of the engineer, local authorities or their duly authorized representative. Any defects discovered in testing shall be corrected and the tests repeated until all defects are eliminated.
- B. This contractor shall coordinate all testing of systems within Division 27 specification section. Follow manufacturer's recommended testing procedures as a minimum unless the following related specification section has further detail of testing procedures. The more stringent testing procedure shall be used.

### **1.21 SCOPE OF WORK**

- A. This contractor shall furnish all the labor and material necessary to install complete communications system for the building.
- B. This contractor shall furnish all the labor and material to install a complete communication system in the new building. The system shall include all items of work as outlined in these specifications and on the drawings.
- C. All work shall be performed by a well-qualified, licensed or certified technician with a thorough knowledge of the various systems involved in this building. It shall be this contractor's responsibility to see that their technicians are familiar with all the various codes, installation procedures and tests applicable to this work.

- D. All equipment shall be new and of the type specified by the engineer unless otherwise noted in these specifications or on the drawings to remain and or be reused.
- E. The intent of the specifications and drawings is for complete installation of the systems outlined in the specifications and drawings so that at the conclusion of construction the system will be turned over to the owner complete and ready for safe and efficient operation.
- F. This contractor is required to furnish and install all such items normally included on systems of this type, which, while not mentioned directly herein or on the drawings are obviously essential to the installation and operation of the system and which are normally furnished on quality installation of this type. The specifications and drawings cannot deal individually with the many minute items that may be eventually required by the nature of the systems.
- G. This contractor, shall before proceeding with any work, review the architectural drawings and specifications. Any conflict between the technology and architectural drawings and specifications shall be reported to the engineer for clarification.
- H. If there is a discrepancy between the drawings and the specifications or within either document, the more stringent requirement shall be estimated unless brought to the engineer's attention and an addendum is issued for clarification.
- I. The Communications Contractor shall establish system elevations prior to fabrication and installation. The Communications Contractor shall coordinate elevations with other trades. All elevations shall be coordinated with all trades in the field prior to installation. When a conflict between trades arises, the design team shall be notified immediately prior to further installation however priority shall be as follows:
  - 1. Lighting Fixtures
  - 2. Gravity flow piping, including steam and condensate.
  - 3. Electrical bus duct.
  - 4. Sheet metal.
  - 5. Cable trays, including access space.
  - 6. Other piping.
  - 7. Conduits and wireway.
- J. Low Voltage Cable Installation
  - 1. This contractor is to install if they are licensed to, or contract with a licensed electrician to install conduit serving low voltage cables located in all mechanical rooms and non-accessible areas and exposed structural areas. Use cable trays in other areas as indicated on the drawings. Where cable trays are not accessible, use J-hooks equal to Cablofil or Caddy Cable CAT. No cable shall be allowed to lie on accessible ceilings tiles. Provide sleeves between walls and accessible clouds. Provide hooks with closure holes. Mount hooks 3 feet on center.
  - 2. All vertical riser and telecommunication room cabling shall be properly supported and bundled by approved velcro straps every 3 feet.

#### **1.22 TRENCHING AND BACKFILLING**

- A. Each contractor is responsible for their own individual trenching and backfilling unless otherwise noted in the drawings or addendum.
- B. All underground utilities, telephone conduit, parking lot lighting, tunnels, etc shall be exactly located prior to digging. This contractor shall be held responsible for all damages caused by failure to do so.
- C. Any backfill shall be tamped and compacted to prevent future settling. The backfill shall be installed to a smooth and level grade and installed in accordance with local codes.
- D. All excess dirt shall be cleared from the area and disposed of as directed by the owner.
- E. Refer to architectural specification sections for additional information.

### **1.23 DAILY HOUSEKEEPING AND CLEANING**

- A. At the end of each workday, the contractor shall remove all of their debris, rubbish, tools, and surplus materials from the project work area. The work area shall be broom cleaned and left in a neat and orderly condition. The contractor, for the removal of debris from the project, shall not use the owner's waste disposal facility.
- B. At end of construction, all equipment shall be cleaned and the premises left in first class condition as far as this contractor's work is concerned.

### **1.24 WALL CONTINUITY (1 HR.)**

- A. All items mounted in 1 hr. rated walls requiring an opening larger than a four inch (4") square (16 sq. inches) require the 1 hr. rating not be degraded.
- B. Any system panels in a 1 hr. wall will require the exterior of the recessed panel be covered with 5/8 inch fire rated gypsum board. This is true for any device requiring more than a 16 sq. inch opening.

### **1.25 DIGITAL MEDIA AGREEMENT**

- A. Computer Aided Drafting (CAD) documents may be available to the contractor for some uses. Contact the engineer prior to bidding to determine what information is available to be transmitted to the contractor in digital form.
- B. When documents are determined to be available, and as requested by the contractor, they will be transmitted upon the completion and execution of the MODUS digital media agreement. A service fee for each document transmitted will be assessed to the contractor. Documents will be transmitted upon payment receipt. Current service fee is \$100.00 per CAD sheet.

### **1.26 SECURE NETWORKABLE DEVICES**

- A. Update network devices to the most current software/firmware.
- B. Change default password of all networkable devices.
  - 1. Passwords shall have at least eight characters.
  - 2. Include uppercase and lowercase letters, numerals, and special characters
- C. Supply MAC address and serial number of all networkable devices.
- D. Work with the Owner's IT department to align to existing IT standards.
- E. Provide to the owner a printed and/or electronic spreadsheet log of all network information including, IP addresses, MAC addresses, logins and password information during system training.

### **1.27 SYSTEM CONFIGURATION AND PROGRAMMING FILES**

- A. Supply system configuration and programming files where export is available.
- B. Supply uncompiled programming for systems applicable.
- C. All configuration and programming shall be property of the owner at conclusion of the project.

### **1.28 COMMISSIONING REQUIREMENTS**

- A. Vendors / Subcontractors
  - 1. Provide all requested submittal data, including detailed startup procedures and specific responsibilities of the owner to keep warranties in force.
  - 2. Assist in equipment testing per agreements with subcontractors and/or contractor.
  - 3. Include cost of all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing, operating, and maintaining equipment according to these contract documents in the base bid price to the contractor.
  - 4. Analyze specified products and verify that the A/E has specified the newest, most current equipment reasonable for this project's scope and budget.
  - 5. Provide requested information regarding equipment sequence of operation and testing procedures.

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6. Review construction checklists and test procedures for equipment installed by factory representatives.

**PART 2 PRODUCTS**

**NOT USED**

**PART 3 EXECUTION**

**NOT USED**

**END OF SECTION 270050**

**SECTION 270526**

**GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Grounding clamps
- B. Splice
- C. Grounding lugs
- D. Wall-mount busbars
- E. Rack mount grounding strip

**1.02 RELATED SECTIONS**

- A. Specification Section 26 0526 - Grounding and Bonding for Electrical System
- B. Specification Section 27 0528 - Pathways for Communication Systems
- C. Specification Section 27 1005 - Telecommunications Cabling Infrastructure

**1.03 REFERENCES**

- A. ANSI/NFPA-70 2014 National Electrical Code (NEC)
- B. ANSI/IEEE Std. 1100-2005 - Recommended Practice for Powering and Grounding Electronic Equipment
- C. TIA-607-B Telecommunications Grounding (Earthing) and Bonding for Customer Premises
- D. ANSI/TIA-606-B Administration Standard for Telecommunications Infrastructure
- E. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings

**1.04 SUMMARY**

- A. Provide a communications bonding and grounding system as described within this specification and drawings. System shall be in compliance with the above cited Codes, Standards and Agencies.
- B. Comply with the requirement for Section 26 0526 - Grounding and Bonding for Electrical System.
- C. Bond the following items within the telecommunications grounding system:
  - 1. All communications system active equipment.
  - 2. All PDU and surge protection equipment.
  - 3. Metallic raceway systems, including metallic cable trays.
  - 4. Communications equipment enclosures (cabinets) or cross-connect frames.
  - 5. Broadband passive devices.
  - 6. Metallic splice cases.
  - 7. Metallic cable screens, armor or shields.
  - 8. All metal cable conduit.
  - 9. Electrical service panels in entrance facilities, telecommunications and equipment rooms.
  - 10. Wall and rack mounted grounding busbars.
  - 11. Exposed building steel that is within 6 feet of equipment racking systems.
  - 12. Building steel extending to earth in outside-plant.
  - 13. All related bonding accessories.

**1.05 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

2. Grounding to conform to applicable building codes.
3. Methods of construction that are not specifically described or indicated in the contract documents to be subject to the control and approval of the owner or their official representatives.
4. Equipment and materials specified shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed.
5. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to written approval by the owner per the substitution policy listed within these specifications.
6. Materials and methods shall comply in every way with above cited Standards and Codes.

#### **1.06 SUBMITTALS**

- A. Shop drawings shall be submitted showing construction details and locations of components, and description and routing of interconnecting cabling.
- B. Manufacturer's data on all products, including but not limited to:
  1. Catalog cut sheets.
  2. Roughing in diagrams.
  3. Installation instructions.
  4. Typical wiring diagrams and risers.
  5. Drawings showing device locations.

#### **1.07 REGULATORY REQUIREMENTS**

- A. Conform to applicable building code for requirements applicable to work specified herein.

#### **1.08 DELIVERY, STORAGE AND HANDLING**

- A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Deliver items in their original factory shipping cartons.
- B. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

#### **1.09 APPROVED MANUFACTURERS**

- A. Panduit
- B. Chatsworth Products, Inc.
- C. Hoffman
- D. Engineer approved equal.

### **PART 2 PRODUCTS**

#### **2.01 GROUNDING CLAMPS**

- A. Bronze Grounding Clamps for Conduit:
  1. Used to ground copper code conductor parallel to, or at a right angle to a rod, tube, or pipe.
  2. Made from high strength, electrolytic cast bronze.
  3. Accommodates a wide range of pipe, tube, rod and conductor sizes.
  4. UL 467 Listed for grounding and bonding with AWG conductor and suitable for direct burial in earth or concrete.
- B. Bronze Grounding Clamps with Lay-in Feature:
  1. Bonds water pipe to continuous copper grounding conductors.
  2. Made from high strength, electrolytic cast bronze.
  3. Bronze hardware provides long term reliable assembly.
  4. UL 467 Listed for grounding and bonding with AWG conductor and suitable for direct burial in earth or concrete.
- C. Zinc Ground Clamp:

1. Bonds steel and aluminum pipe to aluminum conductors.
  2. Made from die cast zinc.
  3. Zinc plated steel hardware.
  4. UL 467 Listed for grounding and bonding.
- D. Universal Beam Grounding Clamp:
1. For bonding structural steel such as I-Beams into bonding network.
  2. Universal, fits on a wide range of standard (angled) and wide flange (parallel) structural steel beams.
  3. Provide a mounting pad suitable for a two-whole compression lug.
  4. Installs quickly and easily with standard ¼" key hex wrench tooling.
  5. UL 467 Listed and CSA 22.2 Certified for grounding and bonding suitable for direct burial in earth or concrete.
  6. Comply with vibration tests per MIL-STD-202G.

## 2.02 SPLICE

- A. Compression-type Aluminum-to-Copper Reducing Splice:
1. Dual rated for use with aluminum or copper conductors.
  2. Factory pre-filled with joint compound and sealed with easy pull-out end plug to inhibit corrosion.
  3. Color-coded end plug and die index numbers marked on barrel for proper crimp die selection.
  4. Tin-plated to inhibit corrosion.
  5. For use up to 35KV and temperature rated 90 degree C when crimped with manufacturer rated crimping tools and dies.
- B. Code/Flex Conductor H-TAPs:
1. Used as a splice, or to tap smaller conductors into larger continuous conductors.
  2. Each HTAP terminates a wide range of conductor sizes and combinations of code and flex conductors Class G, H, and I to suit a variety of applications.
  3. Tap grooves are separated from one another, allowing them to function independently so HTAP can be used with single or multiple conductors, providing maximum design and installation flexibility.
  4. Color coded and marked with manufacturer die index numbers for proper crimp die selection.
  5. UL Listed and CSA Certified, with wide size range of conductor sizes and rated for applications up to 600V when crimped with manufacturer rated tools and dies.
  6. Tin plated to inhibit corrosion.
- C. Code Conductor, Thin Wall, Tin -plated C-TAP:
1. For copper-to-copper splicing or pigtail tap splicing.
  2. Wide wire range-taking capability minimizes inventory requirements.
  3. Color-coded for proper crimp die selection.
  4. Ribbed design provides high strength.
  5. Made from high conductivity wrought copper.
  6. Tin-plated to inhibit corrosion and oxidation.
  7. UL Listed and CSA Certified, with wide size range of conductor sizes and rated for applications up to 600V when crimped with manufacturer rated tools and dies.

## 2.03 GROUNDING LUGS

- A. Copper and Aluminum One-Hole Grounding Lay-in Lug for Bonding Ladder Rack:
1. Used for quick installation of a continuous grounding conductor.
  2. UL 467 Listed for grounding and bonding, copper lugs. UL Listed for direct burial in earth or concrete.
  3. UL 467 Listed for use up to 600V and temperature rated 90 degree C.
- B. Two-hole, Long-barrel Copper Compression Lugs for Grounding Conductors:



1. Meets TIA-607-B requirements for network systems grounding applications.
2. Tested by Telcordia - meets NEBS Level 3 with AWG conductor.
3. For use up to 35KV and temperature rated 90 degree C when crimped with manufacturer rated crimping tools and dies.
4. Color-coded barrels marked with manufacturer's die index numbers for proper crimp die selection.
5. Have long barrel to maximize number of crimps and provides premium wire pull-out strength and electrical performance.
6. Have "inspection window" over tongue to visually assure full conductor insertion.
7. Be tin-plated to inhibit corrosion.
8. Available with NEMA and BISC I hole-sizes and spacing.

#### **2.04 WALL MOUNT BUSBARS (TMGB/TGB)**

- A. Meet BICSI and TIA-607-B requirements for network systems grounding applications.
- B. Employ BICSI hole spacing to 2-hole lugs.
- C. Be made of high conductivity copper and tin-plated to inhibit corrosion.
- D. Come pre-assembled with brackets and insulators attached for quick installation.
- E. Use labels to identify busbars to meet TIA/EIA-606-A.

#### **2.05 RACK MOUNT GROUNDING STRIP**

- A. Provide clean bond to any rack mounted equipment regardless of whether or not equipment has an integrated grounding terminal.
- B. EIA Universal hole pattern.
- C. Provide length required to bond up to 45 RU per rack.

### **PART 3 EXECUTION**

#### **3.01 GENERAL**

- A. It shall be the responsibility of this contractor to adapt the following general guidelines and principles for the requirements of the actual environments where the grounding and bonding systems are to be implemented..
- B. System shall provide equipment ground connections (bonds) from the premises entrance facility and outside-plant earthing system to each telecommunication room ground busbar, through the racking systems to bond the network equipment.
- C. Entire grounding link from equipment to earth should be visually verifiable except where hidden by walls, conduit or pathways.
- D. Installing contractor shall label all elements of the communications bonding network according to guidelines defined in TIA-607-B and ANSI/TIA 606-B.
- E. It is the responsibility of the installer to be knowledgeable of all previously cited Standards and Codes and to bring to the attention of the engineer any conflicts discrepancies to achieve a fully functioning, standards-compliant earthing system.

#### **3.02 TELECOMMUNICATIONS BONDING BACKBONE (TBB)**

- A. Bonding and grounding conductors may be insulated or un-insulated and shall not decrease in size as the grounding path moves closer to earth.
- B. Connections (bonds) between the telecommunications grounding network and associated electrical panels shall be done by a qualified electrician in accordance with guidelines in TIA 607-B and applicable electrical codes.
- C. Bonding Conductors should be continuous and routed in the shortest possible straight line path, avoiding changes in elevation and sharp bends.
- D. TBB conductors shall be protected from mechanical damage and built so as to minimize splicing. Where splicing is unavoidable they shall be done using irreversible compression

splices (C-TAPS) built to that purpose. See the Materials section of this document for appropriate compression splices.

- E. TBB in multi-story buildings with multiple risers shall employ a grounding equalizer (GE) between vertical grounding backbones at the top floor of the building and minimally at every third floor in between to the lowest floor level. The GE shall be no smaller than the largest sized TBB.
- F. Routing grounding conductors through ferrous metal conduit should be avoided, but if it is necessary due to building constraints, any grounding conductor running through ferrous conduit longer than 3 feet shall be bonded at the end using appropriately sized HTAP.
- G. Conductors used to bond TBB to conduit ends shall be of #6 AWG size or larger.
- H. Provide appropriately sized TBB conductor using the pathway distances and the chart found in TIA 607-B.

### **3.03 ENTRANCE FACILITIES AND TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)**

- A. TMGB shall be located in the entrance facility, near the electrical panel to which it will be bonded but installed to maintain clearances required by applicable electrical codes.
- B. TMGB shall be sized according to the anticipated number of bonded connections needed.
- C. TMGB shall have tinned surface to restrain oxidation and be cleaned and antioxidant paste applied prior to fastening conductors.
- D. Connectors on TBB which attach to TMGB shall be of two-hole, long-barrel compression lugs as specified in the Materials section of this document.
- E. Building steel within six feet of the communications grounding system should be bonded into the system with appropriate hardware.
- F. All cables containing a metallic shield or armor shall have that shield properly bonded into the communications grounding system using appropriately sized grounding kits from the approved manufacturers.

### **3.04 BONDING WITHIN RACKS AND CABINETS**

- A. Racks and cabinets shall be bonded into the communications bonding network with conductors of #6 AWG or larger.
- B. Depending on size of the telecommunications room, rack bonding conductors (RBC) may tap into underfloor or overhead grounding conductors, or for smaller TRs (3-5 racks or cabinets), may go directly from the rack to the wall mounted busbar.
- C. Racks, cabinets and similar enclosures shall not be attached serially but must have individual RBC into the grounding system.
- D. Newly installed racks and cabinets shall have vertical grounding busbars installed along one rail to provide clean bonding landing point for all rack mounted equipment. Grounding busbars shall not be isolated from the rack or cabinet.
- E. All painted components of racks/cabinets shall be assembled using serrated grounding washers and thread-forming screws to ensure electrical continuity between the different structural components of the rack/cabinet.
- F. Larger equipment with integral grounding terminals or pads shall be bonded to the vertical busbar with equipment grounding kits attached to those terminals and bonding them to the rack-mounted busbars.
- G. Anywhere two metallic surfaces are to be bonded, contractor shall clean the contact areas of paint or oxidation using abrasive pads, and apply film of anti-oxidation compound between surfaces prior to bonding.
- H. All cable fittings shall be of two-hole compression-type. Mechanical screw-lugs on racking systems will not be accepted and must be removed and replaced at contractor's expense.

- I. All screws used to affix compression lugs to rack-mounted vertical busbars shall be of the thread forming type made specifically for electrical bonding.
- J. Smaller equipment not having integral grounding pads must be bonded to the rack through the equipment mounting flanges using green thread-forming grounding screws with serrations under the head to cut through paint, coatings and oxidation that may be present on the equipment flange. Such equipment shall have minimally one grounding screw per piece of equipment.

**3.05 FIELD QUALITY CONTROL**

- A. On installations confined to a single telecommunications room, the installing contractor shall visually verify continuity of communications bonding system from equipment, through racking systems, to overhead underfloor backbone to the wall mounted busbar in that telecommunications room.
- B. Contractor shall further verify the use of all appropriate bonding accessories in the racking systems such as grounding washers and thread-forming grounding screws.
- C. Installation of a building-wide telecommunications backbone, installing contractor is further responsible for visually verifying sizing and sound installation of the telecommunications bonding backbone including presence of properly sized and installed grounding equalizer conductors between backbones contained in separate risers.
- D. Inspecting contractor shall verify that any conduit larger than 3 feet through which a grounding conductor passes is properly bonded to the grounding conductor as described in this document.
- E. During inspections contractor shall verify compliance with all stipulations specified in this document and compliance with all regulatory references cited.
- F. All openings or gaps in the bonding system during inspections will be recorded in the inspection report and remedied.
- G. During inspections, contractor shall check all grounding and bonding system conductors and connections for tightness and proper installation, including checking proper dies were used on compression taps and fittings by checking embossed die numbers on those connections.

**END OF SECTION 270526**

**SECTION 271005**  
**TELECOMMUNICATIONS CABLING INFRASTRUCTURE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Horizontal copper
- B. Patch panels
- C. Grounding and bonding products

**1.02 SUMMARY**

- A. Work included, but not limited to:
  - 1. Data network backbone cable installation
  - 2. Data network horizontal cable installation
  - 3. Data wiring closet setup
  - 4. Infrastructure cabling management
  - 5. Data patch cables
  - 6. Ground and bonding
  - 7. Testing requirements

**1.03 GENERAL REQUIREMENTS**

- A. The drawings and specifications indicate the intent and direction of the installation. Items and their location are shown diagrammatic and are to be field verified by the cabling contractor prior to completing work associated with the item.
- B. All cabling work shall be performed in strict accordance with all applicable laws, ordinances, codes of local, state and federal government, or other authorities having lawful jurisdiction. The cabling contractor is required to verify all requirements.
- C. The cabling contractor shall furnish all required labor, material, and associated tools to facilitate the installation of all the infrastructure cables and associated items specified herein and with respect to the infrastructure design drawings without damage to the cables, associated items, and/or facilities.
- D. Qualified personnel, utilizing state-of-the-art equipment and techniques shall complete all installation work.
- E. All cables routed outside of the cable runway installed shall be properly supported.
- F. All wall and/or floor penetrations shall be via metal conduit sleeves properly sized, supported and fire stopped.
- G. All materials shall be installed in accordance with the manufacturer's specified recommendations and practices.

**1.04 QUALITY ASSURANCE**

- A. Standards: All telecommunications wiring, cabling devices, and other associated items and work shall conform to the most recent requirements of the following codes, standards, and organizations where applicable:
  - 1. American National Standards Institute (ANSI)
  - 2. Electronic Industries Association (EIA)
  - 3. Federal Communications Commission (FCC)
  - 4. Institute of Electrical and Electronic Engineers (IEEE)
  - 5. International Organization for Standardization (ISO)
  - 6. National Electric Code (NEC)
  - 7. National Fire Protection Association (NFPA)
  - 8. BOCA National Building Code
  - 9. Underwriter's Laboratories (UL)
  - 10. Telecommunications Industry Association (TIA)

11. Building Industry Consulting Services International
  12. Society of Cable Telecommunications Engineers (SCTE)
- B. The copper data infrastructure cable system shall have a manufacturer's material and labor performance certification for the installed cable and components. The certification shall be that UTP Category 6 cabling infrastructure will perform to TIA's specifications for that Category. A manufacturer's written certification document shall be submitted at the completion of the project.
  - C. A matched solution shall be provided end-to-end for all cabling infrastructure. No third party components shall be provided unless otherwise noted elsewhere in the project specification or drawings.
  - D. The installer must be able to provide a warranty to the owner. Duration of the warranty shall be a minimum of ten years from the date of project completion and acceptance. It shall cover all of the product as well as their performance for the warranty period.
  - E. The cabling contractor shall be in business for a minimum of five (5) years.
  - F. The contractor must be registered with BICSI and have at least one Registered Communications Distribution Designer (RCDD) on full-time staff or be approved by the project engineer during the bidding process. Prospective contractors shall seek written approval from project engineer no later than seven days prior to bidding. Include in request to project engineer a list of full-time staff with certifications and references to three projects of similar size and scope in previous two years.
  - G. The contractor must possess current liability insurance certificates.
  - H. Provide a complete and detailed test plan for the telecommunications cabling system including a complete list of test equipment for the components and accessories for each cable type specified, 30 days prior to the proposed test date. Include procedures for certification, validation, and testing.

#### **1.05 SUBMITTALS**

- A. The cabling contractor shall not begin any installation of materials that require a material fact sheet and/or sample to be submitted and approved by the project engineer. If material is installed prior to approval, the bidder is liable for the cost of removal and replacement if the material is not approved.
- B. The cabling is to provide material cut-sheet for all products (including cabling) listed in this specification, and any other material not listed but required for proper installation.
- C. Provide both the manufacturer's certification for all installers and technicians that will have a role in this project as well as all BICSI certifications as outlined in the sections above.
- D. Provide most recent calibration certificate for testing equipment indicating the period of calibration.

#### **1.06 CLOSE-OUT AND FINAL ACCEPTANCE**

- A. Operations and Maintenance Manuals
  1. Commercial off the shelf manuals shall be furnished for operation, installation, configuration, and maintenance of products provided as a part of this project. Submit operations and maintenance data not later than 2 months prior to the date of occupancy.
- B. Drawings and As-Builts
  1. Provide drawings including documentation on cables and termination hardware in accordance with TIA/EIA-606. Drawings shall include schedules to show information for cut-overs and cable plant management, patch panel layouts and cover plate assignments, cross-connect information and connecting terminal layout as a minimum. Drawings shall be provided in hard copy format and on electronic media for project engineer's review and final delivery to owner. Provide the following drawing documentation as a minimum:

- a. Cables - A record of installed cable shall be provided in accordance with TIA/EIA-606. The cable records shall include only the required data fields in accordance with TIA/EIA-606. Include manufacture date of cable with submittal.
- b. Termination Hardware - A record of installed patch panels, cross-connect points, distribution frames, terminating block arrangements and type, and outlets shall be provided in accordance with TIA/EIA-606. Documentation shall include the required data fields only as a minimum in accordance with TIA/EIA-606.
- c. Working Red Line Drawings - A hand completed set of drawings indicating the general cable routing of the backbone cables and the primary routes of the horizontal cables shall be provided. Also indicate all wall and floor sleeves utilized. The drawings for this information shall be a non-working, clean set of drawings.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. The cabling contractor shall coordinate all delivery, storage and handling concerns with the general contractor.
- B. Provide protection from weather, moisture, extreme heat and cold, dirt, dust, and other contaminants for telecommunications cabling and equipment placed in storage.

#### **1.08 APPROVED CABLING VENDORS**

- A. All cabling and connectivity products provided by the structured cabling contractor shall be part of the following complete end-to-end systems:
  1. Panduit
  2. Belden
  3. Commscope
  4. BerkTek
  5. Engineer approved equal.
- B. All components in the cabling channel shall be of the same manufacturer with performance that meets or exceeds the characteristics of the horizontal cabling.

#### **1.09 JACKET TYPE**

- A. This project is planned to have all ducted returns on HVAC equipment. It shall be this contractor's responsibility to make final confirmation. Once confirmed, PVC jacketed cable shall be used. If there are any wild returns on this project, plenum rated cable shall be used.

#### **1.10 COLORS**

- A. The owner shall determine all colors of cables, jack inserts, and other visible components during the submittal process from the standard colors available by each individual manufacturer. No custom colors will be used.

### **PART 2 PRODUCTS**

#### **2.01 HORIZONTAL COPPER**

- A. Data and Voice:
  1. Provide unshielded Twisted Pair (UTP), Category 6 4/pair, 23 AWG to locations identified on the plans.
    - a. Panduit - TX6000
    - b. Commscope Uniprise - UltraMedia 7504
    - c. Belden - Data Twist 3600
    - d. BerkTek - LANmark 1000
    - e. Superior Essex - DataGain 6+
    - f. Engineer approved equal
    - g. Cabling shall be also provided to each video surveillance camera shown on the plans unless otherwise noted.
    - h. Color to be determined by the owner.
- B. Patch Cables - Data Racks (Copper):

1. Provide pre-connectorized copper patch cables that match performance and configuration of horizontal data and voice cabling. Length as required for installation per BICSI standards.
  2. Quantity: Structured cabling subcontractor shall provide sufficient patch cords for 75% of horizontal cable runs. For bidding purposes, use an average cord length of 10 feet for patch cords.
  3. Color and exact length shall be determined by the owner.
- C. Patch Cables - Workstations:
1. Match performance and configuration of horizontal data and voice cabling. Length as required for installation per BICSI standards
  2. Quantity: Structured cabling subcontractor shall provide a workstation patch cord quantity equal to 50% of all wall-terminated data outlets. For bidding purposes, use an average cord length of 10 feet for patch cords. Patch cords shall be turned over to owner.
  3. Color and exact length shall be determined by the owner.

## **2.02 PATCH PANELS**

- A. Data and Voice:
1. Modular 24 or 48 position, 19 inch rack, 1U or 2U, UTP patch panel. Panel to meet performance standards of horizontal cabling manufacturer. Patch panel bracket shall accept RJ45 modular jacks that are utilized at the work area outlet.
    - a. Product shall be a matched solution from cabling manufacturer
    - b. Quantity as needed for all connections in contractor plus 25% at each rack for future growth.

## **2.03 GROUNDING AND BONDING PRODUCTS**

- A. Provide in accordance with UL 467, TIA J-STD-607, and NFPA 70. Components shall be identified as required by TIA/EIA-606. Provide ground rods, bonding conductors, and grounding busbars as specified in specification section 26 0526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. The drawings and specifications are considered to reflect the intent and direction for a complete data cable system.
- B. Quantities shown are for general information and may be incorrect. The bidder is to verify all quantities and is to report any count differences to the engineer prior to submission of their installation response. The cabling contractor will be held responsible for all required quantities to complete the project to the intent and direction of the drawings and specifications.
- C. Material description and manufacturer's part numbers are shown. The cabling contractor is expected and has the responsibility to verify that the part number matches the description. Any discrepancy is to be noted to the engineer prior to response submittal. The cabling contractor is responsible for the correct materials being furnished and installed.
- D. Install telecommunications cabling and pathway systems, including the horizontal and backbone cable, pathway systems, telecommunications outlet/connector assemblies, and associated hardware in accordance with TIA-568-C.1, TIA-568-C.2, TIA-569, NFPA 70 and UL standards as applicable. Provide cabling in a star topology network. Pathways and outlet boxes shall be installed as specified in specification section 26. Install telecommunications cabling with copper media in accordance with the following criteria to avoid potential electromagnetic interference between power and telecommunications equipment. The interference ceiling shall not exceed 3.0 volts per meter measured over the usable bandwidth of the telecommunications cabling.
- E. Install UTP telecommunications cabling system as detailed in TIA-568-C.1. Screw terminals shall not be used except where specifically indicated on plans. Use an approved insulation displacement connection tool kit for copper cable terminations. Do not exceed manufacturers'

cable pull tensions for copper and optical fiber cables. Provide a device to monitor cable pull tensions. Do not exceed 25 pounds pull tension for four pair copper cables. Do not chafe or damage outer jacket materials. Use only lubricants approved by cable manufacturer. Do not over cinch cables, or crush cables with staples. For UTP cable, bend radii shall not be less than four times the cable diameter. Cables shall all be terminated. There shall be no cable with unterminated elements. Cabling shall be continuous with no splices. Label cabling in accordance with paragraph titled LABELING.

- F. This contractor is to install if they are licensed to, or contract with a licensed electrician to install conduit serving low voltage cables located in all mechanical rooms and non-accessible areas and exposed structural areas. Use cable trays in other areas as indicated on the drawings. Where cable trays are not accessible, use J-hooks equal to Cablofil or Caddy Cable CAT. No cable shall be allowed to lie on accessible ceilings tiles.
- G. Provide sleeves between walls and accessible clouds. Provide hooks with closure holes and cable ties. Mount hooks 3 feet on center.

### **3.02 HORIZONTAL CABLING**

- A. Install horizontal cabling as indicated on drawings. Do not untwist Category 6/6A UTP cables more than one half inch from the point of termination to maintain cable geometry. Provide slack cable in the form of a figure eight (not a service loop) on each end of the cable, 10 feet in the telecommunications room, and 12 inches in the work area outlet.

### **3.03 PATHWAYS**

- A. Provide in accordance with TIA-569 and NFPA 70. Provide building communications cabling pathway as specified in Section 26 0533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS.

### **3.04 WORK AREA OUTLETS**

- A. Terminate UTP cable in accordance with TIA-568-C, TIA-568-C.2 and wiring configuration as specified. All fiber optic cabling shall be terminated in accordance with TIA-568-C.3. Follow manufacturer's installation guidelines for all specific requirements related to work area outlet termination.

### **3.05 COVER PLATES**

- A. As a minimum, each outlet shall be labeled as to its function and a unique number to identify cable link in accordance with the section titled LABELING.

### **3.06 PULL CORDS**

- A. Pull cords shall be installed in conduit serving telecommunications outlets that do not have cable installed.

### **3.07 PATCH PANELS**

- A. Patch panels shall be mounted in equipment racks with sufficient ports to accommodate the installed cable plant plus 25 percent spares. Copper entering a patch panel shall be secured to the panel as recommended by the manufacturer to prevent movement of the cable.

### **3.08 EQUIPMENT RACKS, BRACKETS AND CABINETS**

- A. All equipment racks, brackets and cabinets hosting telecommunications equipment shall all be installed in accordance with the manufacturer's recommendations. Permanently anchor all racks to the floor.

### **3.09 GROUNDING AND BONDING**

- A. Provide in accordance with TIA J-STD-607, NFPA 70 and as specified in Section 26 0526 GROUNDING & BONDING FOR ELECTRICAL SYSTEMS.



### 3.10 LABELING

- A. Provide labeling in accordance with TIA/EIA-606. Handwritten labeling is unacceptable. Stenciled lettering for voice and data circuits shall be provided using either thermal ink transfer or laser printing.
- B. Cables shall be labeled using color labels on both ends with identifiers in accordance with TIA/EIA-606.
- C. Workstation outlets and patch panel connections shall be labeled using color coded labels with identifiers in accordance with TIA/EIA-606.

### 3.11 CABLE TESTING

- A. General: Cables are to be tested after installation is complete with Fluke DTX tester or equivalent and delivered in electronic format for engineer review. If for any reason, the drop location, raceway and/or drop location box is removed for additional work of any nature, the drop location is to be re-tested if previously tested. All cables associated with the drop location are to be re-tested. The cost of re-testing is the responsibility of the cabling contractor.
  - 1. The field-test instrument shall be within the calibration period recommended by the manufacturer, typically 12 months.
- B. Category 6/6A Data - Unshielded Twisted Pair (UTP) Cable:
  - 1. Each UTP CAT 6 data cable installed shall be tested and a test result printout sheet shall be furnished at the completion of the project.
  - 2. The test shall be performed after the final cable and device termination has been completed and the faceplate installed. The test shall be of the "Basic Link" from completed end to completed end.
  - 3. The test shall be conducted utilizing a scanner that will generate a sweep frequency 1-250 megahertz signal on all pairs of the cable and test each pair of the cable for:
    - a. Pair mapping
    - b. Cable length
    - c. Insertion loss
    - d. Near-End-Cross Talk (NEXT)
    - e. Attenuation to Near-End-Cross Talk Ratio (ACR)
    - f. Return loss (RL)
    - g. Power Sum Near-End-Cross Talk (PSNEXT)
    - h. Power Sum Equal Level Far-End-Cross Talk (PSELFEXT)
    - i. Far End Cross Talk (FEXT)
    - j. Propagation Delay & Delay Skew
    - k. Impedance
    - l. Capacitance
    - m. Resistance
  - 4. Each data cable shall be tested to EIA/TIA-568, Category 6, compliance for acceptance.
  - 5. Each test result shall indicate the cable number, test date and tester name. All test results are to be submitted to the project engineer in electronic format for review during closeout and final acceptance.
  - 6. No hand written test results will be accepted by the project engineer.

### 3.12 EXTRA MATERIALS AND LABOR

- A. This contractor shall include in their bid an allowance to install five (5) additional data outlets with an average length of 200 feet as directed by the project engineer at any time during the construction process. Any materials that are not used during construction shall be turned over to the owner at the final acceptance of the building.

**END OF SECTION 271005**

**SECTION 271116**  
**COMMUNICATIONS RACKS, FRAMES AND ENCLOSURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Free standing communication racks
- B. Wall mounted racks
- C. Cable management

**1.02 SUMMARY**

- A. Provide all labor, materials, and equipment for the complete installation of each rack.

**1.03 GENERAL REQUIREMENTS**

- A. The drawings and specifications indicate the intent and direction of the installation. Items and their location are shown diagrammatic and are to be field verified by the contractor prior to completing work associated with the item.
- B. All work shall be performed in strict accordance with all applicable laws, ordinances, codes of local, state and federal government, or other authorities having lawful jurisdiction. The contractor is required to verify all requirements.
- C. The contractor shall furnish all required labor, material, and associated tools to facilitate the installation of all the equipment racks, cabinets, frames and associated items specified herein and with respect to the infrastructure design drawings without damage to the cables, associated items, and/or facilities.
- D. Qualified personnel, utilizing state-of-the-art equipment and techniques shall complete all installation work.
- E. All materials shall be installed in accordance with the manufacturer's specified recommendations and practices.

**1.04 QUALITY ASSURANCE**

- A. Standards: All equipment, devices, and other associated items and work shall conform to the most recent requirements of the following codes, standards, and organizations where applicable:
  - 1. TIA - 569-B Commercial Building Standard for Telecommunications Pathways and Spaces
  - 2. ANSI/TIA - 568-C Commercial Building Telecommunications Cabling Standard
  - 3. ANSI/NECA/BICSI 568-2006 - Standard for Installing Commercial Building Telecommunications Cabling
  - 4. TIA - 606-A Administration Standard for Commercial Telecommunications Infrastructure
  - 5. ANSI-J-STD - 607-A Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
  - 6. ANSI/TIA-942 Telecommunications Infrastructure Standard for Data Centers
  - 7. NFPA 70 - National Electric Code
- B. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

**1.05 SUBMITTALS**

- A. The contractor is to provide material cut-sheet for all products listed in this specification, and any other material not listed but required for proper installation.

- B. Provide both the manufacturer's certification for all installers and technicians that will have a role in this project

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. The contractor shall coordinate all delivery, storage and handling concerns with the general contractor.
- B. Provide protection from weather, moisture, extreme heat and cold, dirt, dust, and other contaminants for equipment placed in storage.

#### **1.07 APPROVED EQUIPMENT VENDORS**

- A. All cabling and conductivity products provided by the structured cabling contractor shall be part of the following complete end-to-end systems:
  - 1. Chatsworth Products, Inc.
  - 2. Middle Atlantic Products
  - 3. Tripp Lite
  - 4. Hoffman
  - 5. Great Lakes
  - 6. Engineer approved equal.

### **PART 2 PRODUCTS**

#### **2.01 WALL MOUNTED RACKS**

- A. Enclosed Lockable Wall Cabinet Description:
  - 1. Wall-mounted cabinets shall be manufactured from steel sheet.
  - 2. Each cabinet shall have a rear panel that attaches to the wall, a hinged cabinet body that swings open from the rear panel providing easy access to the rear of equipment and a locking front door.
  - 3. The rear panel shall be 5" (130 mm) deep and shall provide cable access with pre-punched knockouts for conduit along the top and bottom edges of the panel. There shall be a minimum of (4) combination 1/2" and 3/4" conduit knockouts (2 top/2 bottom) and (8) combination 2-1/2" and 3" knockouts (4 top/4 bottom). The back edge of the knockouts will be located 1-5/8" (41 mm) from the back surface of the panel (cabinet/wall) allowing conduit to be attached to the wall with auxiliary framing strut. The cabinet will include rubberized or plastic/composite grommets that fit within the 3" knockouts to protect cables when conduit is not used to route cables. There shall also be one 6" (150 mm) high by 6" (150 mm) wide cutout in the back of the rear panel so that cables can enter the panel through the wall. The rear panel shall provide attachment points for accessory equipment mounting brackets and cable tie points within the panel (cabinet). The manufacturer of the cabinet will sell compatible equipment mounting brackets and cable ties as separate accessories.
  - 4. The cabinet body shall include a single pair of vertical 19"EIA equipment mounting rails. The mounting rails shall be EIA-310-D compliant with the Universal hole pattern. Mounting holes shall be spaced vertically on alternating 5/8"-5/8"-1/2" (15.9 mm - 15.9 mm - 12.7 mm) centers and shall be roll-formed with #12-24 threads. Mounting rails shall provide 12, 18, or 26 rack-mount unit (U) spaces for equipment as specified below.
  - 5. Mounting rails shall be adjustable in depth so that they can be positioned at any point within the cabinet body. The design of all cabinets shall allow an additional pair of mounting rails (for a total of two pairs of mounting rails per cabinet) to be added to the cabinet. The manufacturer of the cabinet will sell compatible mounting rails as a separate accessory.
  - 6. Mounting rails shall bolt in place directly to the cabinet frame. The mounting rails shall be L-shaped. The side of the mounting rails will be punched to provide lacing points for cables.
  - 7. The hinge design that attaches the cabinet body and the rear panel shall allow the rear panel to be removed during installation.

8. The hinge that attaches the cabinet body and the rear panel shall allow the cabinet body to open at least 90°. The hasp used to secure the rear panel and the cabinet body together shall assist in drawing the components together during the locking action.
  9. The cabinet body shall include vents that are designed to accept fan kits. The manufacturer of the cabinet will sell compatible fan and filter kits as separate accessories.
  10. The front door will be hinged and locking. The front door and rear panel will be keyed alike. The front door will have rounded edges and corners. The cabinet body will allow the front door to be attached so that it will swing open from the right or left. The front door will be solid or have a tinted window, as specified below.
  11. Load bearing capacity for cabinets will be 200 pounds (90.7 kg) per cabinet. Load bearing capacity will be stated in the manufacturer's product literature.
  12. Refer to the drawings for quantities.
- B. Enclosed Lockable Wall Cabinet Approved Manufacturers:
1. Chatsworth Products, Inc. #11901-724 (Black, Plexi door, 24" H x 24" W x 18" D, 12U)

## **2.02 CABLE MANAGEMENT**

- A. Horizontal Cable Management for Racks/Frames
1. Place horizontal cable managers above and below each patch panel on/in each rack/frame/cabinet. The horizontal cable manager will guide patch/equipment cords between the vertical cable manager and individual network port connections.
  2. The cable manager will be sized to match cabling requirements. Provide 1U of horizontal cable management for every 2U of connectivity. Cables must be able to access the cable manager so that no ports are blocked by the cables.
  3. The manufacturer will state estimated cable fills for the cable manager in the product data sheet.
  4. The horizontal cable manager will match the rack-mount width of the rack(s)/frame(s)/cabinet(s).
  5. The horizontal manager will attach to the front or rear of the rack/frame/cabinet with screws and will be sized to fit within standard EIA-310-D rack mount spacing. The manufacturer of the horizontal cable manager will sell compatible racks/frames/cabinets.
  6. The horizontal cable manager will be a single-sided C-shaped trough with a cover. The single-sided trough will have a slot or holes at the rear to facilitate front-to-rear cabling through the horizontal manager. The front of the cable manager will have T-shaped cable guides along the top and bottom surfaces of the cable manager. Evenly spaced cable openings in between the T-shaped cable guides allow cables to enter/exit the cable manager into the rack-mount space. The openings will have rounded edges to protect the cables. The cover will be removable, hinged to open up or down and will snap on to secure the cover in the closed position.
  7. The horizontal cable manager shall be a matched solution from the rack/frame manufacturer and be manufactured from sheet aluminum and composite material.
  8. Refer to drawings for quantities.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Cable Management
1. Attach vertical cable managers to the side of the rack/frame using the manufacturer's installation instructions and included hardware.
  2. The color of the rack(s)/frame(s) and cable manager(s) must match.
  3. Door shall be attached to the cable manager and in the closed position after cabling is complete.
- B. Wall-mounted cabinets and open frame racks
1. Provide all components of the cabinet/frame system (cabinet, mounting rails, cable managers, power strips, and accessories).

2. Attach the cabinet to the wall so that the front door and cabinet body can be opened fully without obstruction by other building, storage or architectural components. Follow the manufacturer's installation instructions when securing the cabinet to the wall and backboard. When not attached to the wall, the floor, shelf or tabletop surface on which the cabinet is placed must be able to hold the combined weight of the cabinet and the equipment within the cabinet. The cabinet should not be attached to sheet rock. The cabinet must be attached directly into studs through a  $\frac{3}{4}$ " plywood backboard. The cabinet may be attached to a masonry wall when the installer provides hardware. Use included hardware or the appropriate hardware as defined by local code or the authority having jurisdiction. The top of the cabinet when installed should not exceed 84" above the finished floor.
3. Cables shall enter/exit the cabinet through conduit knockouts in the top and/or bottom of the rear panel of the cabinet or through the rectangular cut out in the back of the rear panel of the cabinet. Use edge-protection grommets on conduit knockouts when cables pass through a conduit knockout but are not enclosed in conduit.
4. Install and adjust to position all accessories including power strips, equipment-mounting rails, fan and filter kits and lights, prior to installing equipment into the cabinet. Verify that fans, light and power strips work prior to installing equipment into the cabinet. Shelves, if used, may be installed with equipment.
5. Provide a telecommunications ground for equipment within the cabinet. Attach a 19" EIA busbar to the equipment mounting rails so that the mounting rails are bonded together. Attach a bonding conductor sized as defined in J-STD-607-A and as defined by local code or the authority having jurisdiction between the Telecommunications Grounding Busbar and the 19" EIA bus bar within the cabinet using two-hole compression lugs to connect the bonding conductor to each busbar. The installer will provide the 19" EIA bus bar, antioxidant compound, the bonding conductor and other necessary hardware required to make the connections between the cabinet and the Telecommunications Grounding Busbar.

**END OF SECTION 271116**

## SECTION 280050

### BASIC ELECTRONIC SAFETY AND SECURITY REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Basic Electronic Safety and Security Requirements specifically applicable to Electrical Division Specification Sections.
- B. Division 28 Specification requirements also include, by reference, all Division 00 and 01 specification sections. This contractor is responsible to review these specification sections. Requirements of these specification sections are included as a part of this contract.
- C. Division 28 Specification requirements also include, by reference, Specification Section 08 7100 - Door Hardware. Review and inclusion of the electrical requirements of this specification section are included as a part of this contract.

##### 1.02 OWNER OCCUPANCY

- A. The owner will occupy the premises during the construction period.
- B. Limit use of site and premises to allow owner occupancy.
- C. Cooperate with the owner to minimize conflict and to facilitate owner's operations.
- D. Schedule the work to accommodate this requirement.

##### 1.03 REGULATORY REQUIREMENTS

- A. This contractor shall give proper authorities all requisite notices relating to work in their charge, obtain official permits, licenses for temporary construction and pay proper fees for it.
- B. This contractor is to be solely answerable for and shall promptly make good all damage, injury or delay to other contractors, to neighboring premises or to persons or property of the public by themselves, by their employees or through any operation under their charge, whether in the contract or extra work.
- C. No attempt has been made to reproduce in these specifications any of the rules or regulations contained in city, state or federal ordinances and codes pertaining to the work covered by these specifications that the contractor be thoroughly familiar with all such ordinances and codes.
- D. The fact that said various rules, regulations and ordinances are not repeated in this specification does not relieve the contractor of the responsibility of making the entire installation in accordance with the requirement of those authorities having jurisdiction.
- E. All work shall comply with the applicable recommendations of:
  - 1. National Board of Fire Underwriters
  - 2. ANSI-NFPA 70 National Electrical Code
  - 3. National Fire Protection Association (NFPA)
  - 4. Occupations Safety and Health Act (OSHA)
  - 5. IBC Building Code (current) and any current applicable city building and or electrical codes.
  - 6. Fire Protection: Conform to UFC and NFPA
- F. Obtain permits and request inspections from authority having jurisdiction.
- G. Conform to latest approved versions of codes.

##### 1.04 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on drawings unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of owner and architect/engineer before proceeding.
- C. This contractor shall, before submitting their bid, visit the site of the project to familiarize themselves with locations and conditions affecting their work.

- D. It is the intent of this specification that the contractor furnishes all labor and material required to complete the installation as outlined in the drawings and specifications. No additions to the contract price shall be allowed due to the failure of this contractor to properly evaluate the effect of existing conditions on the work to be done under this contract.
- E. Whenever renovation or remodeling or relocation of existing equipment is included in the contract, it is imperative that all locations of existing wiring conduits, electrical panels, equipment, services and grades be noted on the job site before bid is submitted and that all elevations and grades be verified before roughing in new work.
- F. This contractor shall provide holes as necessary for the installation of their work and in accordance with materials other than the structure.

#### **1.05 SEQUENCING AND SCHEDULING**

- A. This contractor shall arrange their work in order that it progresses along with the general construction of the building.
- B. This contractor shall be kept informed as to the work of other trades engaged in this project and shall execute their work in such a manner so as not to delay or interfere with progress of other contractors.
- C. Where space for electrical lines and conduit is limited, it is imperative that all such trades coordinate their work so as to Ensure concealment in space provided. Where conflict exists, the design team shall decide priority of space. If work is not properly coordinated, the design team may require removal and relocation of work without additional compensation.

#### **1.06 GUARANTEE**

- A. This contractor shall guarantee all of the apparatus, materials, equipment furnished and labor installed under this contract for a period of one year after date of final acceptance, unless a longer period is specified.
- B. Neither final certificate of payment nor any provisions in the contract documents nor partial or complete occupancy of premises by owner shall constitute an acceptance for work not done in accordance with contract documents or relieve the contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.
- C. Should any defects arise as the result of defective workmanship or material within the guarantee period set forth, this contractor shall make the necessary correction at their own expense.

#### **1.07 ENGINEER APPROVED EQUAL PRODUCTS**

- A. When the engineer, at the request of the interested parties, including the contractor, supplier and manufacturer approved "engineer approved equal" products for this project, such products are approved on the assumption that they will equal or exceed the performance of the products specified.
- B. If such products do not do so after being installed on this project, this contractor shall replace or modify the particular product as necessary to equal the performance of the products specified at no expense to the owner, architect or engineer.
- C. Request for "engineer approved equal" products shall be received by the architect/engineer prior to the last addendum being issued. Requests for substitutions received after this date will not be considered. Substitution requests shall clearly state which products are being considered for substitution. Substitution requests shall include all pertinent product information needed to evaluate the substitution as an "equal".
- D. Similar products shall be all of the same manufacturer and style. There is no exception to this unless prior approval has been granted from engineer.

#### **1.08 OWNER'S RIGHT OF SALVAGE**

- A. Before beginning construction the contractor shall check and verify with the owner each item of existing equipment that must be removed.
- B. The owner will designate which items of material or equipment not reused that they may wish to keep. This contractor shall then remove these items with care and store in a location designated by the owner for the owner's disposal.
- C. All other items of equipment to be removed and not specified for reuse in new construction or reserved by the owner for their use shall become the property of the contractor and shall be removed from the site.

#### **1.09 PROTECTION AND MAINTENANCE**

- A. The work covered by these drawings and specifications involves all work in the existing building.
- B. Where necessary to connect to any existing utility service, this contractor shall contact the owner and shall coordinate any building service connection with the owner so that normal operation to the building is disrupted as little as possible.
- C. Any work to be done in existing structures shall be coordinated with the owner and arrangements made so that traffic flow may be maintained and areas finished where possible before other areas are begun.
- D. This contractor shall protect existing equipment in finished areas from dirt, dust and damage as a result of their work.
- E. Coordinate protection requirements with department heads before beginning construction.
- F. Protect any building openings from unauthorized entry. Coordinate with owner where building entry must be controlled.

#### **1.10 DEMOLITION**

- A. This contractor shall be responsible for the demolition and removal of all existing electrical elements within the project area except as follows:
  - 1. Elements shown on the drawings as "existing to remain and/or to be reused".
  - 2. Elements serving adjacent areas.
  - 3. Elements required for the support of the newly remodeled areas.
  - 4. All elements to be removed are subject to the Owner's Right of Salvage.
- B. Preserve services to the existing facility. Extend/reroute/reconnect the existing systems as required providing for the continued function of these systems.

#### **1.11 CUTTING AND PATCHING**

- A. This contractor shall do all cutting and patching necessary for the installation of their work in all existing and new buildings unless otherwise noted.
- B. In areas where the integrity of fire separation assembly/wall is compromised by the work, this contractor shall be responsible to patch and/or seal openings as necessary to maintain and/or return fire separation to rating as required by applicable codes.
- C. This contractor shall do all cutting and patching required for their work beyond the remodeled areas unless otherwise noted. All finish work shall include patching to match existing adjacent surfaces. Painting shall be by others.

#### **1.12 CLEANING AND RUBBISH**

- A. This contractor, upon completion of their work, shall remove all rubbish and debris resulting from their operation and shall remove it from site at their own expense.
- B. As far as their work is concerned, all equipment shall be cleaned and the premises left in first class condition.
- C. This contractor shall maintain the work area each day to prevent hazardous accumulation of debris from their work.



### **1.13 SEALING AND PENETRATION**

- A. Clearance around the piping passing through fire or smoke rated construction shall be sealed to maintain the rated integrity of the construction (1 hr. 2 hrs. etc.). One and two-hour rated assemblies are to be patched on both sides of the assembly.
- B. This contractor shall verify rating and location of all such construction with the architectural drawings and seal all penetrations.
- C. Manufacturer offering products to comply with the requirements include the following:
  - 1. Dow Corning "Silicone RTV Foam"
  - 2. 3-M Corporation "Fire Barrier Caulk and Putty"
  - 3. Thomas & Betts "Flame Safe Fire Stop System"
- D. Installation of these products are to be in strict accordance with the manufacturer's recommendations and architectural specifications, details or equivalent fire stopping general specification section.
- E. This contractor shall submit shop drawings showing approved sealing assemblies to be utilized on this project.

### **1.14 HAZARDOUS MATERIALS**

- A. If this contractor stores any hazardous solvents or other materials on the site, they shall obtain copies of the safety data sheets for the materials and post them at the site. The contractor shall inform the owner and all employed of any potential exposure to this material.
- B. At no time shall any product containing asbestos be incorporated into the work.
  - 1. If asbestos materials are encountered, report to the owner. The owner will be responsible for asbestos removal.

### **1.15 RECORD DRAWINGS**

- A. This contractor shall provide (at the conclusion of the project) one clean, non-torn, neat and legible "as-built" set of drawings to the owner. These drawings shall show the routing of conduit, wiring and equipment drawn in at scaled locations. All cabling, devices, and endpoints shall be labeled and conform to head end programming and system drawings. All dimensions indicated shall be referenced to a column line. A set of construction blueprints will be furnished for this work.
- B. All electrical panels and electrical installed equipment shall be shown on the "as-built" drawings.
- C. Refer to Architectural Specification Sections for additional requirements.
- D. This contractor shall update these drawings during the project at least every week.

### **1.16 ALTERNATES**

- A. Refer to description of alternate bids under General Specification Sections.

### **1.17 REVIEW OF MATERIALS**

- A. This contractor shall submit to the engineer for review one (1) electronic copy giving a complete list of materials, fixtures, devices and panels they propose to furnish. The brochure shall contain complete information as to the model of equipment, type, size, capacities, dimensions, and illustration. An electronic copy shall be kept on the job at all times.
- B. Checking of submittal drawings by the engineer does not relieve the contractor of the responsibility for the accuracy of such drawings and for their conformity to drawings and specifications unless the contractor notifies engineer, in writing, of such deviation at time such drawings are furnished.
- C. All submittals shall have the date marked on them when the contractor receives them from the supplier. Submittals shall be submitted through the contractor and shall not come direct from the supplier to the architect or engineer.

- D. This contractor shall mark the date and sign each set signifying that the contractor has checked that each of them in their entirety before submitting to the engineer. Submittals that are not dated and signed by the contractor will not be accepted, or checked and will be marked "resubmit" and sent back to the contractor.

#### **1.18 TEST OF SYSTEMS**

- A. This contractor, before concealed, shall test all systems installed under this contract as called for in these specifications and as required by local codes. Tests shall be made in the presence of the engineer, local authorities or their duly authorized representative. Any defects discovered in testing shall be corrected and the tests repeated until all defects are eliminated.
- B. This contractor shall be held responsible for all damage resulting from defects in the system.
- C. Each individual feeder circuit shall be tested at the panel and in testing for insulation resistance to ground; the power equipment shall be connected for proper operation. In no case shall the insulation resistance to ground be less than that required by the National Electrical Code (NEC).

#### **1.19 SCOPE OF WORK**

- A. This contractor shall furnish all the labor and material necessary to install complete safety and security systems for the building.
- B. This contractor shall furnish all the labor and material to install a complete safety and security system in the new building. The system shall include all items of work as outlined in these specifications and on the drawings.
- C. All work shall be performed by a well-qualified and licensed technician with a thorough knowledge of the various systems involved in this building. It shall be this contractor's responsibility to see that their electricians are familiar with all the various codes and tests applicable to this work.
- D. All equipment shall be new and of the type specified by the engineer unless otherwise noted in these specifications or on the drawings to remain and or be reused.
- E. The intent of the specifications and drawings is for complete installation of the systems outlined in the specifications and drawings so that at the conclusion of construction the system will be turned over to the owner complete and ready for safe and efficient operation.
- F. This contractor is required to furnish and install all such items normally included on systems of this type, which, while not mentioned directly herein or on the drawings are obviously essential to the installation and operation of the system and which are normally furnished on quality installation of this type. The specifications and drawings cannot deal individually with the many minute items that may be eventually required by the nature of the systems.
- G. This contractor, shall before proceeding with any work, review the architectural drawings. Any conflict between the technology and architectural drawings shall be reported to the engineer for clarification.
- H. If there is a discrepancy between the drawings and the specifications or within either document, the more stringent requirement shall be estimated unless brought to the engineer's attention and an addendum is issued for clarification.
- I. The Safety and Security Contractor shall establish system elevations prior to fabrication and installation. The Safety and Security Contractor shall coordinate elevations with other trades. All elevations shall be coordinated with all trades in the field prior to installation. When a conflict between trades arises, the design team shall be notified immediately prior to further installation however priority shall be as follows:
  - 1. Lighting Fixtures
  - 2. Gravity flow piping, including steam and condensate.
  - 3. Electrical bus duct.
  - 4. Sheet metal.
  - 5. Cable trays, including access space.

6. Other piping.
  7. Conduits and wireway.
- J. Low Voltage Cable Installation
1. This contractor is to install if they are licensed to, or contract with a licensed electrician to install conduit serving low voltage cables located in all mechanical rooms and non-accessible areas and exposed structural areas. Use cable trays in other areas as indicated on the drawings. Where cable trays are not accessible, use J-hooks equal to Cablofil or Caddy Cable CAT. No cable shall be allowed to lie on accessible ceiling tiles. Provide sleeves between walls and accessible clouds. Provide hooks with closure holes and cable ties. Mount hooks 3 feet on center.

#### **1.20 TRENCHING AND BACKFILLING**

- A. Each contractor is responsible for their own individual trenching and backfilling unless otherwise noted in the drawings or addendum.
- B. All underground utilities, telephone conduit, parking lot lighting, tunnels, etc shall be exactly located prior to digging. This contractor shall be held responsible for all damages caused by failure to do so.
- C. Any backfill shall be tamped and compacted to prevent future settling. The backfill shall be installed to a smooth and level grade and installed in accordance with local codes.
- D. All excess dirt shall be cleared from the area and disposed of as directed by the owner.
- E. Refer to architectural specification sections for additional information.

#### **1.21 DAILY HOUSEKEEPING AND CLEANING**

- A. At the end of each workday, the contractor shall remove all of their debris, rubbish, tools, and surplus materials from the project work area. The work area shall be broom cleaned and left in a neat and orderly condition. The contractor, for the removal of debris from the project, shall not use the owner's waste disposal facility.
- B. At end of construction, all equipment shall be cleaned and the premises left in first class condition as far as this contractor's work is concerned.

#### **1.22 WALL CONTINUITY (1 HR.)**

- A. All items mounted in 1 hr. rated walls requiring an opening larger than a four inch (4") square (16 sq. inches) require the 1 hr. rating not be degraded.
- B. Any branch panel in a 1 hr. wall will require the exterior of the recessed panel be covered with 5/8 inch fire rated gypsum board. This is true for any device requiring more than a 16 sq. inch opening.

#### **1.23 CABLE**

- A. The fire alarm system manufacturer shall approve low voltage cable. All low voltage electrical cable, installed as part of a new fire alarm system, shall be plenum rated cable.
- B. Cable installed without using raceway shall be neatly routed and supported every 3 feet by no less than a nylon wire tie or supported in bridle rings. All wiring in mechanical rooms shall be in conduit. All exposed wiring shall be in raceways. No cable shall be allowed to lie on the accessible ceiling tile.

#### **1.24 DIGITAL MEDIA AGREEMENT**

- A. Computer Aided Drafting (CAD) Documents may be available to the contractor for some uses. Contact the engineer prior to bidding to determine what information is available to be transmitted to the contractor in digital form.
- B. When documents are determined to be available, and as requested by the contractor, they will be transmitted upon the completion and execution of the MODUS digital media agreement. A service fee for each document transmitted will be assessed to the contractor. Documents will be transmitted upon payment receipt. Current service fee is \$100.00 per CAD sheet.

**1.25 SECURE NETWORKABLE DEVICES**

- A. Update network devices to the most current software/firmware.
- B. Change default password of all networkable devices.
  - 1. Passwords shall have at least eight characters.
  - 2. Include uppercase and lowercase letters, numerals, and special characters
- C. Supply MAC address and serial number of all networkable devices.
- D. Work with the Owner's IT department to align to existing IT standards.
- E. Provide to the owner a printed and/or electronic spreadsheet log of all network information including, IP addresses, MAC addresses, logins and password information during system training.

**1.26 SYSTEM CONFIGURATION AND PROGRAMMING FILES**

- A. Supply system configuration and programming files where export is available.
- B. Supply uncompiled programming for systems applicable.
- C. All configuration and programming shall be property of the owner at conclusion of the project.

**1.27 COMMISSIONING REQUIREMENTS**

- A. Vendors / Subcontractors
  - 1. Provide all requested submittal data, including detailed startup procedures and specific responsibilities of the owner to keep warranties in force.
  - 2. Assist in equipment testing per agreements with subcontractors and/or contractor.
  - 3. Include cost of all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing, operating, and maintaining equipment according to these contract documents in the base bid price to the contractor.
  - 4. Analyze specified products and verify that the A/E has specified the newest, most current equipment reasonable for this project's scope and budget.
  - 5. Provide requested information regarding equipment sequence of operation and testing procedures.
  - 6. Review construction checklists and test procedures for equipment installed by factory representatives.

**PART 2 PRODUCTS**

**NOT USED**

**PART 3 EXECUTION**

**NOT USED**

**END OF SECTION 280050**



**SECTION 281600**  
**INTRUSION DETECTION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. System performance
- B. Enclosure
- C. Accessories
- D. Electrical power requirements
- E. Environmental conditions

**1.02 REFERENCES**

- A. Underwriters Laboratories (UL):
  - 1. UL 365 – Police Station Connected Burglar Alarm Units and Systems
  - 2. UL 609 – Local Burglar Alarm Units and Systems
  - 3. UL 611 – Central Station Burglar-Alarm Units
  - 4. UL 985 – Household Fire Warning System Units
  - 5. UL 1023 – Household Burglar Alarm System Units
  - 6. UL 1076 – Proprietary Burglar Alarm Units and Systems
  - 7. UL 1610 – Central Station Burglar-Alarm Units
- B. Federal Communications Commission (FCC):
  - 1. Code of Federal Regulations Title 47-Part 15 – Radio Frequency Devices
  - 2. Code of Federal Regulations Title 47-Part 68 – Connection of Terminal Equipment to the Telephone Network
- C. National Fire Protection Association (NFPA)
- D. NFPA 70 – National Electrical Code

**1.03 SYSTEM DESCRIPTION**

- A. The system shall be a Burglary System that includes the following capabilities:
  - 1. Listed for UL commercial burglary.
  - 2. Supports up to 128 zones.
  - 3. Supports up to eight separate partitions.
  - 4. Supports up to 150 users.
  - 5. Supports up to 96 optional relay outputs.
  - 6. Provides scheduling capability to allow for automated operations.

**1.04 SUBMITTALS**

- A. Submittals shall include manufacturer data sheets for all major system components.

**1.05 QUALITY ASSURANCE**

- A. The alarm manufacturer shall be certified as being compliant with ISO9001.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Ademco Burglary Partitioned Security System
- B. Bosch
- C. Engineer approved equal.

**2.02 SYSTEM PERFORMANCE**

- A. Control Panel: The control panel shall be an eight-partition, UL commercial burglary control panel that supports up to 128 zones using basic hardwired, polling loop, and wireless zones. It shall also provide supervision of the bell output, RF receivers, and relay modules. In addition,

the control shall provide the ability to schedule time-driven events, and allow certain operations to be automated by pressing a single button. The system shall be capable of interfacing with an ECP long-range radio (LRR) unit that can send Contact ID messages, and alphanumeric paging devices. The control shall provide integrated access control and CCTV-switching capability.

- B. Basic Hard Wired Zones: The control shall provide nine style-B hardwired zones with the following characteristics:
  - 1. EOLR Supervision (optional for zones 2-8): Shall support N.O or N.C sensors (EOLR supervision required for UL installations).
  - 2. Individually assignable to one of eight partitions.
  - 3. Supports up to 16 two-wire smoke detectors on one selected zone.
  - 4. Supports four-wire smoke or heat detectors on any zone (power to four-wire smoke detectors must be supervised with an EOL device).
  - 5. Supports up to 50 two-wire latching glass break detectors on one selected zone.
- C. Partitions: The control shall provide the ability to operate eight separate areas, each functioning as if it had its own control. Partitioning features shall include:
  - 1. A common lobby partition (1-8), which can be programmed to perform the following functions:
    - a. Arms automatically when the last partition that shares the common lobby is armed.
    - b. When the first partition that shares the common lobby is disarmed.
  - 2. A master partition (9), used strictly to assign keypads for the purpose of viewing the status of all eight partitions at the same time (master keypads).
    - a. Assignable by zone.
    - b. Assignable by keypad.
    - c. Assignable by relay to one or all eight partitions.
- D. Ability to display fire and/or burglary and panic and/or trouble conditions at all other partitions' keypads (selectable option).
- E. Certain system options selectable by partition, such as entry/exit delay and subscriber account number.
- F. User Codes: The control shall accommodate 150 user codes, all of which can operate one or all partitions. Certain characteristics must be assignable to each user code, as follows:
  - 1. Authority level (master, manager, or several other operator levels). Each user code (other than the installer code) shall be capable of being assigned the same or a different authority level for each partition that it will operate.
  - 2. Opening/closing central station reporting option.
  - 3. Specific partitions that the code can operate.
  - 4. Global arming capability (ability to arm all partitions the code has access to in one command).
  - 5. Use of an RF (button) to arm and disarm the system (RF key must first be enrolled into the system).
- G. Peripheral Devices. The control shall support up to 30 addressable ECP devices, which can be any combination of keypads, RF receivers, relay modules, annunciator modules, and interactive phone modules. Peripheral devices have the following characteristics:
  - 1. Each device set to an individual address according to the device instructions.
  - 2. Each device enabled in system programming.
  - 3. Each device's address shall be (via a programming option).
- H. Keypad/Annunciator: The control shall accommodate up to 16 keypads or six touch-screen (i.e., advanced user interface) keypads. The keypads shall be capable of the following:
  - 1. Performing all system arming functions.
  - 2. Being assigned to any partition.
- I. Provide the following scheduling capabilities:
  - 1. Open/close schedules for control of arming/disarming and reporting.

2. Holiday schedules allows different time windows for open/close schedules.
  3. Timed events for activation of relays, auto-bypassing and un-bypassing, auto-arming and disarming, etc..
  4. Access schedules for limiting system access to users by time.
  5. End user output programming mode provides twenty timers for relay control.
  6. Automatic adjustment for daylight savings time.
- J. Built-in user's manual and descriptor review for end-user convenience, the control panel shall contain a built-in user's manual. It shall include the following capabilities:
1. By depressing any of the function keys on the keypad for five seconds, a brief explanation of that function shall scroll across the alphanumeric display.
  2. By depressing the READY key for five seconds, all programmed zone descriptors shall be displayed (one at a time). This feature shall provide a check for installers and ensure all descriptors have been entered properly.
- K. Programming: The control shall be capable of being programmed locally or remotely.

### **2.03 ENCLOSURE**

- A. The control panel shall be enclosed in a metal cabinet, suitable for wall mounting. The dimensions shall not exceed 14.5" H x 18" W x 4.3" D.

### **2.04 ACCESSORIES**

- A. Key Switch:
1. Key switch for arming or disarming partition of security system.
  2. Single-gang flush switch with stainless steel faceplate.
  3. Two status LED's for armed/disarmed visual indication.
  4. High-security round lock with tamper switch.
  5. Provide four keys to owner at substantial completion.
  6. Where shown on the exterior of a building, provide with weatherproof cover.
- B. Wall Mounted Motion Sensor:
1. Detection Pattern: 50 ft. x 40 ft.
  2. Ambient temperature compensation above and below body temperature.
  3. Recommended mounting height of 7'-6"
  4. Digital fluorescent filter.
  5. Single gang semi-flush device.
- C. Ceiling Mounted Motion Sensor:
1. Diameter Detection Pattern; 50 ft.
  2. Ambient temperature compensation above and below body temperature.
  3. Recommended mounting height between eight feet and 16 feet.
  4. Digital fluorescent filter.
  5. Semi-recessed ceiling device.
- D. Glass Breakage Sensor:
1. Detection at up to 30 feet from source.
  2. Detects both "flex" and "break" patterns.
  3. Single gang semi-flush wall-mounted device.
- E. Standard Entry Key Pad:
1. Self-lit 32 character display.
  2. Oversized constantly lit keys

### **2.05 ELECTRICAL POWER REQUIREMENTS**

- A. System Power: The fire and burglary alarm system shall operate using standard 120 volts AC, 60 Hz power.
- B. Control Primary Power: Transformer power shall be 16.5 VAC, 40VA.



- C. Backup Battery: A rechargeable 12 VDC, gel type, lead acid backup battery shall be provided. The battery shall be rated between 7 and 34 ampere hours (AH).
- D. Alarm Power: Alarm power shall be 12 VDC, 1.7 amps for each bell output.
- E. Auxiliary Standby Power: Standby power shall be 12 VDC, 750 mA maximum.
- F. Fusing: The battery input, auxiliary, and bell outputs shall be protected using PTC circuit breakers. All outputs shall be power limited.

## **2.06 ENVIRONMENTAL CONDITIONS**

- A. The Fire and Burglary Alarm System shall be designed to meet the following environmental conditions:
  - 1. Storage Temperature: The system shall be designed for a storage temperature of -10 deg C to 70 deg C.
  - 2. Operating Temperature: The system shall be designed for an operating temperature of 32 deg F to 120 deg F.
  - 3. Humidity: The system shall be designed for normal operation in an 85% relative humidity environment.
  - 4. Electromagnetic Interference: The system shall meet or exceed the requirements of FCC Part 15, Class B devices, FCC Part 68, IEC EMC directive.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Submission of a proposal confirms that the contract documents and site conditions are accepted without qualifications unless exceptions are specifically noted.
- B. The site shall be visited on a regular basis to appraise ongoing progress of other trades and contracts, make allowances for all ongoing work, and coordinate the requirements of this contract in a timely manner.

### **3.02 INSTALLATION**

- A. The system shall be installed and tested in accordance with the manufacturer's installation instructions. The following conditions are applicable:
  - 1. In order to ensure a complete, functional system, for bidding purposes, where information is not available from the owner upon request, the worst-case condition shall be assumed.
  - 2. Interfaces shall be coordinated with the owner's representative, where appropriate.
  - 3. All necessary back boxes, pull boxes, connectors, supports, conduit, cable, and wire shall be furnished and installed to provide a complete and reliable system installation. Exact location of all boxes, conduit, and wiring runs shall be presented to the owner for approval in advance of any installation.
  - 4. All conduit, cable, and wire shall be installed parallel and square with building lines, including raised floor areas. Conduit fill shall not exceed 40 percent. All wires shall be gathered and tied up to create an orderly installation.
- B. Use manufacturer recommended minimum size conductors for detection and signal circuit conductors. Install wiring to match fire alarm wiring required.
- C. Make conduit and wiring connections to door hardware devices furnished and installed under architectural specification sections.
- D. Connect alarm control panel to the owner's telephone system.
- E. Completely remove existing security system. Patch back openings.

### **3.03 TESTING AND CERTIFICATION**

- A. This contractor shall demonstrate the functionality of the system upon completion of installation, documenting the result of all tests and providing these results to the owner. The system shall be tested in accordance with the following:

1. This contractor shall conduct a complete inspection and test of all installed equipment. This includes testing and verifying connection to equipment of other divisions.
  2. This contractor shall provide staff to test all devices and all operational features of the system for witness by the owner's representative and the authority having jurisdiction. The contractor shall provide two-way radio communications to assist in the testing. The owner's representative, prior to acceptance, must witness all testing.
- B. The Testing and Certification shall take place as follows:
1. System shall be tested in conjunction with the manufacturer's representative.
  2. All deficiencies noted in the above test shall be corrected.
  3. Test results shall be submitted to the consultant or owner's representative.
  4. System test witnessed by owner's representative and correction of any deficiencies noted.
  5. The owner's representative shall accept the system.
  6. System test shall be witnessed by the authority having jurisdiction, and any deficiencies that are noted shall be corrected.
  7. A letter of certification shall be provided to indicate that the tests have been performed and all devices are operational.

### **3.04 FIELD QUALITY CONTROL**

- A. Test in accordance with NFPA 72.

### **3.05 MANUFACTURER'S FIELD SERVICES**

- A. Include services of technician to supervise installation, adjustments, final connections, system testing, and owner training.

### **3.06 DEMONSTRATION**

- A. Demonstrate normal and abnormal modes of operation, and required responses to each.

**END OF SECTION 281600**



**SECTION 283100**  
**FIRE DETECTION AND ALARM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fire alarm and smoke detection control panel
- B. Peripheral devices
- C. Fire alarm wire and cable
- D. Fire/smoke dampers
- E. Cellular communicator

**1.02 RELATED SECTIONS**

- A. Section 08 7100 - Door Hardware
- B. Section 21 1300 - Fire Suppression Sprinkler System
- C. Section 21 2000 - Fire Extinguishing System
- D. Section 26 0533 - Raceways and Boxes for Electrical Systems

**1.03 REFERENCES**

- A. NFPA 70 - National Electrical Code
- B. NFPA 72 - National Fire Alarm Code
- C. NFPA 101 - Life Safety Code
- D. International Building Code
- E. International Fire Code
- F. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems

**1.04 SYSTEM DESCRIPTION**

- A. Provide and install a manual and automatic fire alarm system that shall meet or exceed current IBC/IFC code requirements in accordance with NFPA 72.
- B. Fire alarm system shall include the system wiring, raceways, pull boxes, terminal cabinets, outlet and mounting boxes, control equipment, alarm and supervisory signal initiating devices, alarm notification appliances and other accessories required for a complete operating system.

**1.05 SUBMITTALS**

- A. Shop Drawings: Provide a scaled building layout showing each device and wiring connection required.
- B. Product Data: Provide electrical characteristics and connection requirements.
- C. Test Reports: Indicate satisfactory completion of required tests and inspections.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation and starting of products.
- E. Contractor shall submit software logic, flow diagrams, battery calculations and one line diagrams illustrating device loops.
- F. Contractor shall be responsible for submitting a copy of these documents to the local Authority having jurisdiction or state for required review.
- G. Submit copies of NICET certifications as described in this specification section.

**1.06 PROJECT RECORD DOCUMENTS**

- A. Record actual locations of all initiating devices, signaling appliances, shut down relays, power supplies, and end-of-line devices. Illustrate each SLC loop that is planned.

- B. Indicate device addresses on the drawings.
- C. Deliver to owner as both hard copy and electronic file.

#### **1.07 OPERATION AND MAINTENANCE DATA**

- A. Operation Data: Operating instructions.
- B. Maintenance Data: Maintenance and repair procedures.
- C. Configuration Data: Printouts of configuration settings for all devices.
- D. Routine Maintenance Checklist.

#### **1.08 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum ten years experience.
- B. Contractor: The contractor shall have a fully equipped, factory trained, and manufacturer certified service and installation organization.
- C. Supervisor: The job supervisor shall be a NICET Level II (or higher) technician and be a full-time employee of the certified reseller. Supervisor shall be responsible for programming and testing.
- D. Technician: A fire alarm technician shall have a minimum of four years experience terminating and installing fire alarm systems. The technician shall also be factory trained in the installation, adjustment, testing and operation of the equipment specified. The technician shall be capable of answering trouble calls from a permanently maintained location less than 100 miles from project site.
- E. Installer: The installer shall be a company specializing in installing the products specified in this section with minimum three years experience, a NICET certified installer and/or licensed electrician shall be allowed to install wire, cable, conduit and back boxes for the fire alarm system.
- F. A list of technicians with any level of responsibility with this project shall be submitted for review and acceptance during the submittal process. A copy of their NICET Certification(s) shall be included.

#### **1.09 REGULATORY REQUIREMENTS**

- A. Conform to requirements of NFPA 72 and NFPA 101.
- B. Furnish products listed and classified by UL, FM approved for purpose specified and indicated.

#### **1.10 MAINTENANCE SERVICE**

- A. A maintenance program shall be offered to the owner at the end of the warranted period to meet NFPA requirements.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Notifier (Basis of Design)
- B. Farenhyt
- C. Gamewell FGI
- D. Seimens
- E. Engineer approved equal.

#### **2.02 FIRE ALARM AND SMOKE DETECTION CONTROL PANEL**

- A. The main FACP Central Console shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors,

addressable modules, control circuits, and notification appliance circuits, local and remote operator terminals, printers, annunciators, and other system controlled devices.

- B. The Notifier FIREWARDEN-50 control panel shall be the basis of design.
- C. In conjunction with intelligent Loop Control Modules and Loop Expander Modules, the main FACP shall perform the following functions:
  - 1. Supervise and monitor all intelligent addressable detectors and monitor modules connected to the system for normal, trouble and alarm conditions.
  - 2. Supervise all initiating signaling and notification circuits throughout the facility by way of connection to addressable monitor and control modules.
  - 3. Detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as programmed. In the event of CPU failure, all SLC loop modules shall fallback to degrade mode. Such degrade mode shall treat the corresponding SLC loop control modules and associated detection devices as conventional two-wire operation. Any activation of a detector in this mode shall automatically activate associated Notification Appliance Circuits.
  - 4. Visually and audibly annunciate any trouble, supervisory, security or alarm condition on operator's terminals, panel display, and annunciators.
  - 5. When a fire alarm, trouble or supervisory condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:
    - a. The system alarm LED shall flash.
    - b. A local piezoelectric audible device in the control panel shall sound a distinctive signal.
    - c. The 640-character backlit LCD display shall indicate all information associated with the condition, including the type of alarm point and its location within the protected premises.
    - d. All system outputs assigned via preprogrammed equations for a particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.
- D. The control panel shall be capable of expansion via up to 1 SLC modules. Each module shall support a maximum of 50 analog/addressable devices for a maximum system capacity of 50 points. The system shall be capable of 8 annunciator points per system regardless of the number of addressable devices.
- E. The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit 640-character liquid crystal display, individual, color coded system status LEDs, and a QWERTY style alphanumeric keypad for the field programming and control of the fire alarm system. Said LCD shall also support graphic bit maps capable of displaying the company name and logo of either the owner or installing company.
- F. The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.
- G. The door shall provide a key lock and include a transparent opening for viewing all indicators. For convenience, the door shall have the ability to be hinged on either the right or left-hand side.
- H. The control unit shall be modular in structure for ease of installation, maintenance, and future expansion.
- I. Communicator:
  - 1. Universal Digital Alarm Communicator Transmitter
    - a. The UDACT-2 is capable of transmitting the status of software zones (Alarm and Trouble), System Trouble, Panel Off-Normal, Supervisory, Bell Trouble, Low Battery, and AC Fail.
    - b. Dual phone lines with line voltage detect.

### 2.03 PERIPHERAL DEVICES

- A. Fire Sensors:
  - 1. All fire sensors shall mount on a common base to facilitate the changing of sensor type if building conditions change.
  - 2. Each sensor shall have the capability to be tested for alarm from the sensor location.
  - 3. Each sensor shall be capable of being tested for alarm via command from the transponder.
  - 4. Each sensor shall respond to transponder scan for information with its type identification to preclude inadvertent substitution of another sensor type.
  - 5. The transponder shall operate with the installed type but shall initiate mismatch (trouble) condition until the proper type is installed or programmed sensor type changed.
  - 6. Each sensor shall respond to transponder scan for information. Such response proves end-to-end sensor response including the operation of the sensor electronics.
  - 7. Provide an addressable relay to control a 110-volt solenoid valve, which holds water off. See detail on the drawings. This is for sprinkler flow switches at elevator.
- B. Manual Fire Alarm Stations:
  - 1. Design based on Notifier NOT-BG12LX or equal.
  - 2. Fire alarm pull station with red Lexan body, semi-flush mounted.
- C. Automatic Smoke Detectors:
  - 1. Design based on Notifier NP-200 or equal.
  - 2. Photo-electric smoke sensors.
- D. Thermo-Detectors:
  - 1. Design based on Notifier NH-100 or equal.
  - 2. Area thermo-detectors shall be 135 degree rat-of-rise fixed type and shall cover 2500 sq. ft.
- E. Relay Modules:
  - 1. Design based on Notifier NC-100R.
  - 2. The control module shall provide an addressable output for a separately powered alarm indicating circuit for a control relay.
  - 3. The control module shall provide a supervised indication circuit where indicated on the drawings. An open circuit fault shall be annunciated at the transponder. Subsequent alarm signaling shall occur in spite of the fault condition.
- F. Horn/Strobe Indicators:
  - 1. Design based on Notifier P(A)2(B)L or equal.
    - a. P2WL - Wall mount, white.
    - b. PC2WL - Ceiling mount, white
  - 2. Mounted to comply with Americans with Disabilities Act.
  - 3. Flush mounted unit shall have thermoplastic faceplate.
  - 4. Visual Alarm Light: Xenon Light.
- G. Strobes:
  - 1. Design based on Notifier S(A)R(B) or equal.
    - a. SWL - Wall mount, white.
    - b. SCWL - Ceiling mount, white.
  - 2. Mounted to comply with Americans with Disabilities Act.
  - 3. Flush mounted unit shall have thermoplastic faceplate.
- H. Duct Smoke Detectors:
  - 1. Design based on Notifier XXX or equal.
    - a. Notifier DNR - Housing.

- b. Notifier NP-100R - Detector.
- c. Notifier DSTS - Sampling Tube.
- d. Notifier RTS151 - Remote Test Station.
2. Furnish and install duct smoke detectors in supply and return air ducts for all the air handling units with fan shutdown relays.
3. **Provide remote key resets for these detectors. Coordinate installation location with design team prior to rough-in.**

#### **2.04 FIRE ALARM WIRE AND CABLE**

- A. Fire Alarm Power Branch Circuits: Building wire as specified by the manufacturer.
- B. Initiating Device and Indicating Appliance Circuits: All fire alarm wiring shall be in metallic conduit or open raceway system concealed in finished areas as specified. Wiring shall be as specified by the manufacturer.

#### **2.05 FIRE/SMOKE DAMPERS**

- A. Electrical contractor shall provide and install 120 volt wiring for smoke dampers. Fire alarm contractor shall provide and install code compliant detection at each fire/smoke damper or smoke damper. Fire alarm contractor shall coordinate signal from Fire Alarm panel to HVAC control system to shut down associated units.
- B. Where a damper is installed within an un-ducted opening in a wall, a smoke detector shall be installed within 5 feet of the damper.
- C. Dampers shall be controlled/monitored by the fire alarm system via addressable relays and monitor modules that interrupt power to the damper. Dampers shall close when power is removed. Direct control from duct detector relays is not allowed. One fire alarm addressable relay may control multiple dampers but shall only be grouped for the same air handling unit equipment. Damper power circuit shall be on the same electrical branch as the associated air handling equipment, when on emergency power, the same transfer switch shall serve the air handling equipment and associated dampers
- D. Dampers shall close when associated air handling equipment is shut down. A relay provided by the T.C.C. shall initiate damper closure through a dedicated fire alarm monitor module. Fire alarm programming shall associate monitor module(s) with respective damper operation.
- E. Dampers that close more than 80% of air from an air handling unit (AHU) shall be interlocked with AHU shutdown programming and shall provide an appropriate delay to allow sufficient time (usually 120 seconds) to allow AHU fans to slow down prior to damper closure to prevent high-static pressure trips. Delays shall be initiated by the building automation system, provide additional control relays to achieve delays and inhibit signals.
- F. All smoke damper circuits shall be dedicated.
- G. See the mechanical and electrical drawings for damper locations.
- H. Furnish and install a momentary test switch at each fire/smoke and smoke damper to allow proof of damper operation.

#### **2.06 CELLULAR COMMUNICATOR**

- A. Design based on Notifier #CELL-CAB-N.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install manual station with operating handle 48 inches on center above finished floor. Install audible and visual signal devices 90 inches above floor or six inches (6") below ceiling, whichever is lower in accordance with ADA Guidelines.
- C. Automatic Detector Installation: Conform to NFPA 72.



- D. Assist owner in providing cellular service to cellular dialer 4 weeks prior to substantial completion.
- E. Provide and install monitor modules required to successfully monitor all planned Ansul, pre-action sprinkler and/or clean agent suppression systems.
- F. This contractor shall be responsible for installing an indication system that meets or exceeds the required strobe intensity per NFPA 72.
- G. This contractor shall be responsible for installing an indication system that results in a tone reaching 15 dB over ambient or louder. Horns shall not reach a volume that is greater than 105dB in any room.
- H. This contractor is responsible to provide all necessary components and wiring for service to approved HVAC equipment 2000 cfm (and larger), approved kitchen hoods and approved fire suppression services. Coordinate exact requirements with HVAC, kitchen equipment, and fire suppression contractors.
- I. This contractor is responsible to provide all necessary components and wiring for service to mute Sound Masking, Audio and Paging Systems:
  - 1. Connect Fire Alarm Control Unit (FACU) to the audio system utilizing a supervised line and addressable relays, per NFPA 72, to shut down and effectively mute all sound masking, audio and paging systems.
  - 2. The FACU and associated supervised lines to meet UL 2572 ensuring the shutdown mechanism is properly supervised and is reliable and will in no way damage the FACU or audio system.
  - 3. The FACU and associated relays must not introduce any noise into the sound masking, audio or paging system.
  - 4. Muting ambient sound during an emergency is necessary to meet ADA suggested guidelines and NFPA acoustic requirements.

### **3.02 ELECTRICAL REQUIREMENTS**

- A. All wiring shall be concealed within walls. No exposed raceways except areas with exposed structure. Coordinate conduit routing with the architect. Provide conduit for wiring located in non-accessible areas. In areas with accessible ceilings, use j-hooks as specified. Provide sleeves through walls and floors (3/4 inch minimum). Do not exceed a 40% pipe fill.
- B. Minimum 3/4 inch conduit size.
- C. Fire alarm cable installed in conduit shall not be shared by any other low voltage system cable.
- D. All cable terminations shall be located within the device itself or in a junction box. Exposed splices are not acceptable.
- E. Make conduit and wiring connections to door release devices, sprinkler flow switches, and sprinkler valve tamper switches. This contractor is responsible for all wiring and conduit to the sprinkler system post indicating valve, when this valve is provided. See drawings for location.
- F. Provide and Install insulated bushing on end of raceways.
- G. All fire alarm devices, junction and pull boxes shall be installed so they are easily accessible without removing light fixtures, equipment, conduits, junction boxes or other items.
- H. Provide locking breaker on 120 VAC power source and label "Fire Alarm." Locking breaker shall be painted red. Any power source to FACP or devices shall be labeled with location of Power source for room number, panel and circuit number.
- I. Fire alarm control and remote power panel's power shall be supplied by a surge protected dedicated circuit(s).
- J. Auxiliary functions that are powered from a remote source must be monitored for power if they do not go to the operational mode for fire protection. (i.e. A power opener purge door that must open to purge air through building or a stairway air pressurization fan that must be monitored for power in case the breaker is shut off.)

**3.03 FIELD QUALITY CONTROL**

- A. Test in accordance with NFPA 72.
- B. Upon completion of the fire alarm system installation, the contractor shall provide a written statement advising the architect of completion and to be in compliance with fire and electrical codes, and in accordance with wiring diagrams, instructions and directions provided by the manufacturer.
- C. Representative of the manufacturer shall certify the system complete and that the owner has received adequate instructions in system operation.

**3.04 MANUFACTURER'S FIELD SERVICES**

- A. Prepare and start systems.
- B. Include services of certified technician to supervise installation, adjustments, final connections and system testing.

**3.05 DEMONSTRATION**

- A. Demonstrate normal and abnormal modes of operation and required responses to each.

**3.06 CABLE**

- A. The fire alarm system manufacturer shall approve the low voltage cable and cable size. All low voltage electrical cable, which is installed as part of the new fire alarm system shall be plenum rated.
- B. The cable that is installed without using raceway shall be neatly routed and supported every three feet (3'). All wiring in mechanical rooms shall be in conduit. All exposed wiring shall be in raceway. No cable shall be allowed to lie on the accessible ceiling tile.
- C. Cable associated with smoke control or stairwell pressurization systems shall be installed in continuous raceway.

**3.07 CERTIFICATION**

- A. The fire alarm system shall be installed and operating within the manufacturers defined parameters and be certified by the manufacturer's representative's signature.
- B. Certification shall be turned over to the owner prior to closing of this project.

**END OF SECTION 283100**



