

# PROJECT MANUAL

## **Gateway Visitor Center**

March 30, 2016

Prepared for:

Town of Saratoga - On behalf of Historic Hudson &  
Hoosic Rivers Partnership  
12 Spring Street  
Schuylerville, New York 12871

Prepared by:

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21 Congress Street, Suite 201  
Saratoga Springs, NY 12866-4160

Project No. 2015-006.10

**BID SET # \_\_\_\_\_**



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### NOTICE TO BIDDERS

Project: Gateway Visitor Center

Owner: Town of Saratoga - On behalf of Historic Hudson & Hoosic Rivers Partnership  
12 Spring Street  
Schuylerville New York 12871  
Attn: **Joe Finan** < joe.finan111@gmail.com >

Consultant: Saratoga Associates  
21 Congress Street, Suite 201  
Saratoga Springs, New York 12866  
Attn: Sara Madison, RA  
(518) 587-2550 ext. 2247

Bids are requested for the construction of the Canal Region Gateway Visitor Center located at 30 Ferry Street, Schuylerville, NY 12871 as shown and described in the Contract Documents. Sealed bids will be received by the Saratoga Town Hall at 12 Spring Street, Schuylerville, NY 12871. The Owner will receive Bids until 10:00 AM local standard time on Friday, the 6th day of May 2016, at which time they will be publicly opened and read aloud.

The work is as shown in the Project Plans and described in the Project Manual. State prevailing wage rates apply to this project.

A Pre-bid Conference will be held at the site of the Gateway Visitor Center located at 30 Ferry Street, Schuylerville, NY 12871 on Friday, April 22, 2016 at 9:00 AM local time. All modifications to the Bidding Documents resulting from the Pre-bid Conference will be issued by addendum.

Project work shall commence on or about June 6, 2016 with substantial completion expected February 10, 2017. 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 the Owner can utilize the work for its intended use. The approximate date of Final Completion of work is May 1, 2017. The Contractor has the responsibility of completing the work within the scheduled time as set forth in the project schedule.

Bidders are required to provide Bid security equal to 5 percent of the Bid Sum. Bid security shall be in the form of a certified check, payable to the Owner, or Bid Bond. All Bid securities, except that of the three (3) lowest bidders, will be returned within 10 days of the bid opening.

Refer to other bidding requirements described in the enclosed AIA Document A701- Instructions to Bidders and Section 00210 – Supplementary Instructions to Bidders.

Submit your Bid on the Bid Form provided **in duplicate**. No bidder may withdraw their bid within 90 days after submission.

Sets of documents may be obtained on or after 12:00 PM April 8, 2016 at the Saratoga Town Hall located at 12 Spring Street, Schuylerville, NY 12871. A check payable to the Town of Saratoga - On behalf of Historic Hudson & Hoosic Rivers Partnership in the amount of \$49.00 per set is required as a deposit for the bid documents. Documents will be shipped by UPS or Federal Express upon receipt of the requester's credit account number to cover the cost of shipping.

Documents may also be reviewed at:

Saratoga Town Hall  
12 Spring Street  
Schuylerville New York 12871

Performance and Payment Bonds for 100 percent of the Contract Sum payable to the Schuylerville Public Library will be required of the successful bidder. The Agreement will be written between the successful Bidder and the Town of Saratoga - On behalf of Historic Hudson & Hoosic Rivers Partnership.

The forty nine (\$49.00) dollar deposit for plans and specifications will be refunded to bidders that have submitted bids in full conformance with this notice and if bid documents are returned in good condition within 30 days of bid opening.

Bidders are required to visit the site, examine the facilities, and become familiar with existing conditions. Bidders are encouraged to attend the Pre-bid Conference.

Addenda will be issued only to those bidders obtaining complete sets of documents.

The Owner reserves the right to accept or reject any or all Bids, to re-advertise for new bids, or to waive any informality in connection with the bids.

The project is governed by bidding requirements of the State of New York General Municipal Law and applicable funding requirements.

DBE: The Contractor is required to put forth a good faith effort to achieve with 30% MBE/WBE participation goal percentage as his/her sub-contractors.



# AIA<sup>®</sup> Document A701<sup>™</sup> – 1997

## *Instructions to Bidders*

for the following PROJECT:

*(Name and location or address):*

THE OWNER:

*(Name and address):*

THE ARCHITECT:

*(Name and address):*

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### ADDITIONS AND DELETIONS:

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

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

## **ARTICLE 1 DEFINITIONS**

§ 1.1 Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement or Invitation to Bid, Instructions to Bidders, Supplementary Instructions to Bidders, the bid form, and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications and all Addenda issued prior to execution of the Contract.

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

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

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

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

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

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

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

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

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

§ 2.1 The Bidder by making a Bid represents that:

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

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

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

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

## **ARTICLE 3 BIDDING DOCUMENTS**

### **§ 3.1 COPIES**

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

§ 3.1.2 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the Advertisement or Invitation to Bid, or in supplementary instructions to bidders.

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

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

## § 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

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

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

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

## § 3.3 SUBSTITUTIONS

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

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

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

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

## § 3.4 ADDENDA

§ 3.4.1 Addenda will be transmitted to all who are known by the issuing office to have received a complete set of Bidding Documents.

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

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

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

## ARTICLE 4 BIDDING PROCEDURES

### § 4.1 PREPARATION OF BIDS

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

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

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

§ 4.1.4 Interlineations, alterations and erasures must be initialed by the signer of the Bid.

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

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall make no additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name of the Bidder and the nature of legal form of the Bidder. The Bidder shall provide evidence of legal authority to perform within the jurisdiction of the Work. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

## § 4.2 BID SECURITY

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

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

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

## § 4.3 SUBMISSION OF BIDS

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

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

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

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

## § 4.4 MODIFICATION OR WITHDRAWAL OF BID

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

§ 4.4.2 Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the signature of the Bidder. Written confirmation over the signature of the Bidder shall be received, and date- and



time-stamped by the receiving party on or before the date and time set for receipt of Bids. A change shall be so worded as not to reveal the amount of the original Bid.

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

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

## **ARTICLE 5 CONSIDERATION OF BIDS**

### **§ 5.1 OPENING OF BIDS**

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

### **§ 5.2 REJECTION OF BIDS**

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

### **§ 5.3 ACCEPTANCE OF BID (AWARD)**

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

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

## **ARTICLE 6 POST-BID INFORMATION**

### **§ 6.1 CONTRACTOR'S QUALIFICATION STATEMENT**

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request, a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted as a prerequisite to the issuance of Bidding Documents.

### **§ 6.2 OWNER'S FINANCIAL CAPABILITY**

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

### **§ 6.3 SUBMITTALS**

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

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

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

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder in writing if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, (1) withdraw the Bid or (2) submit an acceptable substitute person or entity with an adjustment in the Base Bid or

Alternate Bid to cover the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

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

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

### **§ 7.1 BOND REQUIREMENTS**

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Bonds may be secured through the Bidder's usual sources.

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

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

### **§ 7.2 TIME OF DELIVERY AND FORM OF BONDS**

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

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond. Both bonds shall be written in the amount of the Contract Sum.

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

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

## **ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR**

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

# Additions and Deletions Report for AIA<sup>®</sup> Document A701<sup>™</sup> – 1997

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

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 15:54:17 on 03/31/2010.

## PAGE 1

*(Name and location or ~~address~~  
address):*

...

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

...

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

...

## ~~TABLE OF ARTICLE~~TABLE OF ARTICLES

## ***Certification of Document's Authenticity***

***AIA® Document D401™ – 2003***

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 15:54:17 on 03/31/2010 under Order No. 0595225635\_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A701™ – 1997 - Instructions to Bidders, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

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*(Signed)*

---

*(Title)*

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*(Dated)*

## SECTION 00 2100

### SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

The following supplements add to, delete from or change the Instructions to Bidders as set forth in AIA Document A701, 1997 edition. Where any article, paragraph, sub-paragraph, sentence, or word contained in the Instructions to Bidders is added to, deleted or changed, the remaining unaltered provisions of that article, paragraph, subparagraph or sentence shall remain in effect. The following supplements take precedence over the Instructions to Bidders.

#### **ARTICLE 1 DEFINITIONS**

ADD Paragraph 1.10 reading:

- 1.10 Business days are considered as Monday through Friday, excluding holidays.

#### **ARTICLE 3 BIDDING DOCUMENTS**

##### 3.1 COPIES

CHANGE entire subparagraph 3.1.1 to read:

- 3.1.1 Refundable Bidding/Contract documents may be obtained from:

Owner: Town of Saratoga  
12 Spring Street  
Schuylerville New York 12871  
Attn: **Joe Finan** <joe.finan111@gmail.com >

Documents consist of a Project Manual and Construction Drawings. Sets will be furnished at a cost of forty nine dollars (\$49.00) each, with checks payable to the "Town of Saratoga". Each set shall contain the documents of the Contract.

Parties requesting documents are solely responsible for the execution and cost of handling and shipping the documents. Document sets may be (1) picked up from the address above, or (2) the party requesting the documents by mail must send a check or money order payable to the "Town of Saratoga" to **Joe Finan** at the above address. The request must include a Federal Express or UPS account number, which will be used to deliver the bidding documents. The mailing date will be considered the bidders date of receipt. Partial sets are not available and the Owner is not responsible for full or partial sets obtained from other sources.

- 3.1.2 DELETE subparagraph 3.1.2 in its entirety.

##### 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

CHANGE entire subparagraph 3.2.2 to read:

- 3.2.2 No interpretation of the meaning of the contract documents, of existing conditions, or of the scope of work will be made to anyone verbally. Every request for such interpretation must be in writing, addressed to Sara Madison, Saratoga Associates, at 21 Congress Street, Suite 201, Saratoga Springs NY 12866, and, to be given consideration must be received at least four (4) business days (i.e. Monday through Friday, excluding holidays) prior to the date for the opening of the bids.

ADD subparagraphs 3.2.4 and 3.2.5 reading:

- 3.2.4 The Bidding Documents for this project have been prepared using (1) a program for project work prepared by and approved by the owner, (2) site survey information, (3) limited observations obtained by the Architect/Engineer at the project site.

Where existing conditions are obscured or concealed from the Owner or Architect's/Engineer's view prior to the start of this project's construction activities, portrayal of such conditions in the documents is based on reasonable implications and assumptions. The Owner and Architect/Engineer do not imply or guarantee to the bidders in any way that such portrayals in the documents are accurate or true.

### 3.3 SUBSTITUTIONS

CHANGE paragraph 3.3 in its entirety, including sub-paragraphs 3.3.1, 3.3.2, and 3.3.3 to read:

- 3.3.1 Each bidder shall base his bid upon the materials and equipment described in the bidding documents, or equivalents.
- 3.3.2 The burden of proof of the merit of the proposed equivalent is upon the proposer. In order for the Architect/Engineer to judge the merit of the proposed equivalent, the bidder shall submit to the Architect/Engineer a minimum of ten (10) days prior to the bid date, drawings, catalog cuts, performance and test data, and any other information necessary for an evaluation and written approval by the Architect/Engineer. A statement setting forth (1) how the proposed equivalent differs from the specifications, and (2) any changes in other materials, equipment or work that incorporation of the equivalent would require shall be included.
- 3.3.3 The Architect's/Engineer's decision of approval or disapproval of a proposed equivalent shall be final and will occur prior to receipt of bids. In the event of an adverse (negative) decision by the Architect/Engineer, acting as the Owner's representative, no claim of any sort shall be made or allowed against the Architect/Engineer or the Owner by the Contractor, manufacturer, jobber or other supplier of the articles proposed.

### 3.4 ADDENDA

CHANGE entire subparagraph 3.4.3 to read:

- 3.4.3 No Addenda will be issued later than three (3) business days prior to the time specified for receipt of bids, except an Addendum withdrawing the request for bids or one which includes postponement of the time for receipt of bids.

ADD paragraphs 3.5 reading:

### 3.5 TAX LIABILITY

Bidders are exempted from payment of manufacturer's excise taxes for materials purchased for the exclusive use of the Owner, provided that the manufacturer has complied with rules and regulations of the Commissioner of Internal Revenue.

New York State Sales Tax does NOT apply to this project. Contractors are exempt from payment on purchase of materials for the execution of this Contract which are permanently installed and are part of the work. Such taxes shall not be included in the bids. Exemption Certificates will be supplied upon request.

All other taxes, such as sales tax on rented equipment or on items not permanently installed are still applicable and shall be included in the bidder's proposal. Refer to Paragraph 3.6 of the Supplementary Conditions contained within this project manual for more detailed information.

## **ARTICLE 4 BIDDING PROCEDURES**

### **4.1 FORM AND STYLE OF BIDS**

CHANGE entire subparagraph 4.1.1 to read:

- 4.1.1 Bids shall be submitted on unaltered legible copies of the bid forms contained in this project manual in duplicate.

- 4.1.6 DELETE subparagraph 4.1.6 in its entirety.

### **4.2 BID SECURITY**

DELETE entire subparagraphs 4.2.1, 4.2.2 and 4.2.3 and ADD.

- 4.2.1 Each bid must be accompanied by a certified check of the bidder, or a bid bond prepared by a surety company licensed in New York State.

The bidder shall require the Attorney-in-fact who executes the required bond on behalf of the surety to affix thereto a certified and current copy of his power of authority indicating the monetary limit of such power.

Bid security shall be provided in the amount of 10% of the total amount of the base bid.

Bid security shall be payable to the "Town of Saratoga".

If certified check is utilized, the bidder shall provide written confirmation from a licensed New York State surety company that Performance and Labor/Material Bonds will be available to such bidder for this project.

The apparent successful bidder(s), upon failure or refusal to furnish the required Performance and Labor/Material Payment Bonds and execute a contract within fourteen (14) calendar days after he has received notice of the acceptance of his bid, shall forfeit his bid security as liquidated damages for such failure or refusal, and not as a penalty.

The successful bidder(s) shall have his bid security returned upon execution of an Owner/Contractor Agreement. Unsuccessful bidders shall have their bid security returned following execution of Owner/Contractor Agreement(s) or the Ninety (90) day period, whichever occurs first.

### **4.3 SUBMISSION OF BIDS**

CHANGE entire subparagraph 4.3.1 to read:

- 4.3.1 Bids will be received at the Saratoga Town Hall ONLY until 10:00 a.m. local time on Friday, May 6, 2016.

An opaque sealed envelope containing the bid must be marked "SEALED BID", bear the name of the project and bidder. If forwarded by a public or privately operated mail or delivery service, the sealed envelope containing the proposal must be enclosed in another envelope, and identified in accordance with the above.

Bids shall be submitted in **duplicate** using unaltered legible copies of the bid forms provided in this manual. The proposals should be addressed, sent or delivered to the attention of:

Saratoga Town Hall  
12 Spring Street

Schuylerville New York 12871  
Attn: **Joe Finan** <joe.finan111@gmail.com >

The following executed form(s) shall be submitted along with the Bid security:

1. Bid Form, in duplicate

#### 4.4 MODIFICATION OR WITHDRAWAL OF BID

ADD the following sentence to subparagraph 4.4.1 reading:

- 4.4.1 No bidder may withdraw his bid within the Ninety (90) day period following the time of the bid opening.

DELETE entire subparagraph 4.4.4

### **ARTICLE 6 POST-BID INFORMATION**

#### 6.1 CONTRACTOR'S QUALIFICATION STATEMENT

CHANGE entire subparagraph 6.1 to read:

- 6.1 The apparent low bidder(s) shall submit to the Architect/ Engineer within three (3) business days of the bid opening time, a properly and fully executed AIA Document A305, Contractor's Qualification Statement. Other bidder's shall submit same if requested by the Architect/Engineer.

#### 6.3 SUBMITTALS

CHANGE subparagraph 6.3.1 to read:

- 6.3.1 Within five (5) business days of the bid opening time, the apparent low bidder(s) shall furnish to the Owner through the Architect/Engineer in writing:

ADD subparagraph 6.3.1.4 reading:

- 6.3.1.4 The apparent low bidder shall furnish in writing a preliminary progress schedule, showing dates for major elements of construction. Also to be furnished is a detailed schedule of values breaking down the work components with each work component assigned a monetary value. The sum of all the components shall equal the total contract amount.

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

#### 7.1 BOND REQUIREMENTS

CHANGE entire subparagraphs 7.1.1, 7.1.2 and 7.1.3 to read:

- 7.1.1 The Owner requires the apparent successful bidder to furnish and deliver bonds covering the faithful performance of the contract work and payment of all obligations arising thereunder, duly executed by the bidder and a surety company licensed to do business in New York State.

- 7.1.2 The premiums shall be included in the bid and paid by the Contractor. The bidder shall proportionally distribute the cost of such bonds between the base bid.

- 7.1.3 The dollar value of such bonds shall equal one hundred percent (100%) of the sum of the Owner/Contractor Agreement. The value of the bonds shall be adjusted upward if and as the contract sum is adjusted upward from the original contract sum stated in the agreement.



7.2 TIME OF DELIVERY AND FORM OF BONDS

CHANGE entire subparagraph 7.2.1 to read:

7.2.1 The bidder shall deliver the required bonds to the Owner on or before the time of execution of the Owner/Contractor Agreement.

CHANGE entire subparagraph 7.2.3 to read:

7.2.3 The bonds shall be dated the same as the Owner/Contractor Agreement.

**ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR**

CHANGE Article 8 to read:

The form of agreement between Owner and Contractor shall be based on an amended Standard Form of Agreement Between Owner and Contractor where the Basis of Payment is a Stipulated Sum - AIA Document A101-2007.

**END OF SECTION**

**SECTION 00 4110**

**BID FORM**

Project: Gateway Visitor Center  
30 Ferry Street  
Schuylerville New York, 12871

Attn: **Joe Finan** < joe.finan111@gmail.com >

Date: .....

Submitted by:  
(full name) .....

(full address) .....

.....

**OFFER:**

**ITEM 1 – BASE BID AMOUNT**

Having examined the Place of The Work and the Construction Drawings prepared by The Saratoga Associates, Landscape Architects, Architects, Engineers and Planners, P.C., dated 02-29-16, for the above mentioned project, we, the undersigned, hereby propose to perform the Work, for the Sum of:

..... dollars

(\$.....)

in lawful money of the United States of America.

All applicable federal and State of New York taxes are included in the Bid Amount.

**Bidder shall include in the base bid amount, a contingency allowance stipulated sum/price of the following amounts for change order use upon Owner's instruction:**

<b>General Construction Contract</b>	<b>\$53,500.00</b>
<b>Electrical Contract</b>	<b>\$7,400.00</b>
<b>Mechanical Contract</b>	<b>\$3,500.00</b>
<b>Plumbing Contract</b>	<b>\$3,750.00</b>

**ITEM 2 - PROPOSED EQUIVALENTS**

If the bidder proposes to use materials and equipment other than those specified, he shall list below any equivalents he proposes to use.

Materials and equipment not listed on this sheet and not proposed as equivalents in the bid may not be

considered, evaluated, or accepted as equivalents after the bids are received.

Additional sheets will be provided on request.

SPECIFIED ITEM

PROPOSED EQUIVALENT

### **ITEM 3 – LIST OF SUBCONTRACTORS**

The bidder shall list below all Subcontractors he proposes to use.  
Additional sheets will be provided on request.

SUBCONTRACTOR

ADDRESS

### **ITEM 4 - ACKNOWLEDGMENTS**

Acknowledgment is hereby made of the receipt of the following Addenda:

Addendum No. \_\_\_\_\_ dated: \_\_\_\_\_

Addendum No. \_\_\_\_\_ dated: \_\_\_\_\_

The foregoing proposal includes all supervision, taxes (if any), overhead (including bond and insurance costs), profit and other considerations normally included in construction contract costs.  
This offer shall be open to acceptance for thirty days from the bid closing date.

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

- Execute the Agreement within seven days of receipt of Notice of Award.
- Commence work on or about June 6, 2016.

If this Bid is accepted, we will substantially complete the Project work on or before February 10, 2017.

### **ITEM 5 - BID FORM SIGNATURES**

Sign Bid Form, as follows:

- Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Affix seal.
- Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Affix seal at each signature.
- Corporation: Signature of a duly authorized signing officer in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the Bid is signed by officials other than the president and secretary of the company, or the

president/secretary/treasurer of the company, submit a copy of the by-law resolution of their board of directors authorizing them to do so, with the Bid Form in the bid envelope.

- Joint Venture: Signature of each party of the joint venture under their respective seals in a manner appropriate to such party as described above, similar to requirements for Partnerships.

BIDDER:

.....  
(full name of firm)

.....  
(if joint venture: full name of firm)

BY / TITLE:

.....

BY / TITLE:

.....

BY / TITLE:

.....

was hereunto affixed in the presence of:

.....  
(Authorized signing officer) (Seal)

**END OF BID FORM**



# AIA<sup>®</sup> Document A101<sup>™</sup> – 2007

## ***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.

AIA Document A201<sup>™</sup>–2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

## TABLE OF ARTICLES

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

### ARTICLE 1 THE CONTRACT DOCUMENTS

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

### ARTICLE 2 THE WORK OF THIS CONTRACT

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

### ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.

*(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)*

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

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

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

*(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)*

**Portion of Work****Substantial Completion Date**

, subject to adjustments of this Contract Time as provided in the Contract Documents.

*(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)*

**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 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

*(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)*

§ 4.3 Unit prices, if any:

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

Item	Units and Limitations	Price Per Unit (\$0.00)
------	-----------------------	-------------------------

§ 4.4 Allowances included in the Contract Sum, if any:

*(Identify allowance and state exclusions, if any, from the allowance price.)*

Item	Price
------	-------

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

Init.

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

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

- .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of percent ( %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;
- .2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of percent ( %);
- .3 Subtract the aggregate of previous payments made by the Owner; and
- .4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

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

- .1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and  
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)
- .2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:

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

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

## § 5.2 FINAL PAYMENT

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

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

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

## ARTICLE 6 DISPUTE RESOLUTION

### § 6.1 INITIAL DECISION MAKER

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



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

## **§ 6.2 BINDING DISPUTE RESOLUTION**

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:

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

- ☐ Arbitration pursuant to Section 15.4 of AIA Document A201–2007
- ☐ Litigation in a court of competent jurisdiction
- ☐ Other *(Specify)*

## **ARTICLE 7 TERMINATION OR SUSPENSION**

**§ 7.1** The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

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

## **ARTICLE 8 MISCELLANEOUS PROVISIONS**

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

**§ 8.2** Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.  
*(Insert rate of interest agreed upon, if any.)*

%

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

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

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

§ 8.6 Other provisions:

## ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

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

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

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

§ 9.1.3 The Supplementary and other Conditions of the Contract:

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

§ 9.1.4 The Specifications:

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

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

§ 9.1.5 The Drawings:

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

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

§ 9.1.6 The Addenda, if any:

Number	Date	Pages
--------	------	-------

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

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

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

.2 Other documents, if any, listed below:

*(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents)*

*unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)*

#### **ARTICLE 10 INSURANCE AND BONDS**

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

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

**Type of insurance or bond**

**Limit of liability or bond amount (\$0.00)**

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

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

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

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

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

Init.

## **Additions and Deletions Report for** **AIA<sup>®</sup> Document A101<sup>™</sup> – 2007**

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

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 09:56:24 on 01/27/2010.

*There are no differences.*

## ***Certification of Document's Authenticity***

***AIA® Document D401™ – 2003***

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 09:56:24 on 01/27/2010 under Order No. 0595225635\_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A101™ – 2007 - Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

---

*(Signed)*

---

*(Title)*

---

*(Dated)*



# AIA<sup>®</sup> Document A310<sup>™</sup> – 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)

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

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

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

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

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

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_

_____	_____
(Witness)	(Contractor as Principal) (Seal)
_____	_____
	(Title)
_____	_____
(Witness)	(Surety) (Seal)
	_____
	(Title)

**CAUTION:** You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

Init.

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ACD43070810

# **AIA** Document A312™ – 2010

## Payment Bond

**CONTRACTOR:**

(Name, legal status and address)

**SURETY:**

(Name, legal status and principal place of business)

**OWNER:**

(Name, legal status and address)

**CONSTRUCTION CONTRACT**

Date:

Amount:

Description:

(Name and location)

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

e \_\_\_\_\_

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

(FOR INFORMATION ONLY — Name, address and telephone)

**AGENT or BROKER:**

**OWNER'S REPRESENTATIVE:**

(Architect, Engineer or other party:)

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 A312-2010 combines two separate bonds, a Performance Bond and a Payment Bond, into one form. This is not a single combined Performance and Payment Bond.

§ 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)*

**SURETY**

Company:

*(Corporate Seal)*

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

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

Address \_\_\_\_\_

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

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

Address \_\_\_\_\_

**CAUTION:** You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.

# **AIA** Document A312™ – 2010

## **Performance Bond**

**CONTRACTOR:**

*(Name, legal status and address)*

**SURETY:**

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

**OWNER:**

*(Name, legal status and address)*

**CONSTRUCTION CONTRACT**

Date:

Amount:

Description:

*(Name and location)*

**BOND**

Date:

*(Not earlier than Construction Contract Date)*

Amount:

Modifications to this Bond: ☐ None ☐ See Section 16

**CONTRACTOR AS PRINCIPAL**

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

**SURETY**

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

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

Name \_\_\_\_\_

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

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

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

e \_\_\_\_\_

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

*(FOR INFORMATION ONLY — Name, address and telephone)*

**AGENT or BROKER:**

**OWNER'S REPRESENTATIVE:**

*(Architect, Engineer or other party:)*

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 A312–2010 combines two separate bonds, a Performance Bond and a Payment Bond, into one form. This is not a single combined Performance and Payment Bond.

§ 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)*

**SURETY**

Company: \_\_\_\_\_

*(Corporate Seal)*

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

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

Address \_\_\_\_\_

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

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

Address \_\_\_\_\_

**CAUTION:** You should sign an original AIA Contract Document, on which this text appears in RED. An original assures that changes will not be obscured.



# AIA® Document A201™ – 2007

## General Conditions of the Contract for Construction

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

THE OWNER:  
(Name, legal status and address)

THE ARCHITECT:  
(Name, legal status and address)

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14	TERMINATION OR SUSPENSION OF THE CONTRACT
15	CLAIMS AND DISPUTES

### ADDITIONS AND DELETIONS:

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Init.

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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 which 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. 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.

## **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.

## **Additions and Deletions Report for** **AIA<sup>®</sup> Document A201<sup>™</sup> – 2007**

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

Note: This Additions and Deletions Report is provided for information purposes only and is not incorporated into or constitute any part of the associated AIA document. This Additions and Deletions Report and its associated document were generated simultaneously by AIA software at 09:57:10 on 01/27/2010.

*There are no differences.*

## ***Certification of Document's Authenticity***

***AIA® Document D401™ – 2003***

I, , hereby certify, to the best of my knowledge, information and belief, that I created the attached final document simultaneously with its associated Additions and Deletions Report and this certification at 09:57:10 on 01/27/2010 under Order No. 0595225635\_1 from AIA Contract Documents software and that in preparing the attached final document I made no changes to the original text of AIA® Document A201™ – 2007 - General Conditions of the Contract for Construction, as published by the AIA in its software, other than those additions and deletions shown in the associated Additions and Deletions Report.

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*(Signed)*

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*(Title)*

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*(Dated)*

## SECTION 00 8100

### SUPPLEMENTARY CONDITIONS

#### GENERAL

The following supplements add to, delete from or change the General Conditions of the Contract for Construction as set forth in AIA Document A201 – 2007 (Electronic Format). Where any article, paragraph, sub-paragraph, sentence, or word contained in the General Conditions is added to, deleted or changed, the remaining unaltered provisions of that article, paragraph, subparagraph or sentence shall remain in effect. The following supplements take precedence over the General Conditions. In the event of conflict, the terms of the Owner/ Contractor Agreement shall prevail.

#### **ARTICLE 1 GENERAL PROVISIONS**

##### 1.1.7 THE PROJECT MANUAL

CHANGE entire subparagraph 1.1.7 to read:

The Project Manual is this volume, which includes all the work contents listed in the foregoing TABLE of CONTENTS.

##### 1.2 EXECUTION, CORRELATION AND INTENT

ADD the following subparagraphs 1.2.4, through 1.2.10 reading:

- 1.2.4 Any work included by reference in any section to another specification section shall be included as work under the contract, whether or not it is called for under the section referred to. Failure to cross-reference such items shall not relieve the Contractor from the obligations to provide such work.
- 1.2.5 Should any conflict be found in or between the drawings and specifications, the Contractor shall be deemed to have estimated on the basis of performing the work by the most expensive way. The Architect/Engineer, in case of such conflict, may interpret or construe the drawings and specifications so as to secure the most substantial and complete performance of the work as is most consistent with its needs and requirements, and in that manner the Architect/Engineer shall be the sole judge.
- 1.2.6 All work shall be installed so as to be readily accessible for operation, maintenance, inspection, and repair. Minor deviations from the drawings may be made to accomplish this, but changes of magnitude or changes involving increased cost shall not be made without authorization as provided under the contract.
- 1.2.7 The drawings and specifications determine the general arrangement and locations of equipment and work. The Contractor shall, with approval of the Architect/Engineer and without extra charge, make reasonable modifications in layout needed to prevent conflicts with the work of other trades or for proper execution of the work.
- 1.2.8 Dimensions of work shall not be determined by scale or rule from the drawings; figured dimensions shall be followed unless modifications are needed.
- 1.2.9 Follow drawings in laying out work and check drawings of other trades relating to work to verify spaces in which work will be installed. Maintain maximum space conditions at all points.
- 1.2.10 Where work of Contractor will be installed in close proximity to work of other trades, or where there is evidence that work of Contractor will interfere with work of other trades, he shall assist in

working out space conditions to make satisfactory adjustment. If Contractor installs work before coordinating or so as to cause interference with work of other trades, he shall make changes necessary to correct condition without extra charge.

## **ARTICLE 2 OWNER**

### **2.1 DEFINITION**

ADD the following subparagraph 2.1.3 reading:

- 2.1.3 The term Owner as used in the context of this contract is the Town of Saratoga - On behalf of Historic Hudson & Hoosic Rivers Partnership whom is contracting and paying for the contracted work.

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

DELETE entire subparagraph 2.2.1

CHANGE entire subparagraph 2.2.5 to read:

- 2.2.5 The Owner will furnish the Contractor with six (6) copies of drawings and project manual(s). Additional copies are available at labor and material cost.

ADD the following subparagraph 2.2.6 reading:

- 2.2.6 The Owner will retain a consultant throughout the construction phase of the project. In summary, and for the Owner's benefit, the consultant, or its sub-consultants, will perform the following duties:

- inspect construction activities on a full time basis throughout the construction project to verify the quality and quantity of work performed;
- advise the Owner of concerns and provide notice of any contract work which does not comply with the contract documents;
- review shop drawings and review and certify Contractor applications for payments, change order cost quotations and claims.

The specific duties, responsibilities and limitations of authority of the consultant shall be as set forth in the Owner/Architect Agreement, and will be provided upon request by the Contractor.

## **ARTICLE 3 CONTRACTOR**

### **3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR**

ADD the following subparagraph 3.2.4 reading:

- 3.2.4 Where existing conditions are obscured or concealed from the Owner or Architect's/Engineer's view prior to the start of this project's construction activities, portrayal of such conditions in the documents is based on reasonable implications and assumptions. The Owner and Architect/Engineer do not imply or guarantee to the Contractor in any way that such portrayals in the documents are accurate or true.

### **3.3 SUPERVISION AND CONSTRUCTION PROCEDURES**

ADD the following subparagraphs 3.3.4, 3.3.5 and 3.3.6 reading:



- 3.3.4 During periods of active construction, consult daily and cooperate with the Owner, for coordination of work being performed by the Owner's own forces.
- 3.3.5 The Contractor shall promote coordination of his work with the work of Sub-contractors. Check daily or more often if required, regarding Sub-contractors whose work cannot proceed until completion of preceding work.
- 3.3.6 Each Contractor shall initiate and obtain all actions required of others in connection with the work of this contract such as that required of utility companies, municipal agencies, and his own sub-contractors.

#### 3.4 LABOR AND MATERIALS

ADD the following subparagraphs 3.4.4 through 3.4.15 reading:

- 3.4.4 The Contractor shall comply with the Prevailing Wage Rates Schedules as published by the Bureau of Public Works, State of New York, Department of Labor, included herein.
- 3.4.5 No materials or supplies for the work shall be purchased by the Contractor or by any Sub-Contractor subject to any chattel mortgage or under a conditional sale or other agreement by which an interest is retained by the seller. The Contractor warrants that he has good title to all materials and supplies used by him in the work, or re-sold to the Owner pursuant to this contract document, free from all liens, claims or encumbrances.
- 3.4.6 All materials used permanently in the work shall be new unless otherwise specified. The apparent silence of the specifications as to any detail or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of first quality are to be used, and all interpretations of this specification shall be made upon this basis.
- 3.4.7 Manufacturer's identification shall be inconspicuous, but where nameplates contain information relative to characteristics or maintenance, they shall be clearly visible and located for easy access.
- 3.4.8 Equipment intended for permanent installation shall not be operated for temporary purposes without the written permission of the Architect/Engineer.
- 3.4.9 Materials shall be delivered in manufacturer's original sealed containers with complete identification of contents and manufacturer, and kept sealed in original containers until used. Labels shall not be removed until materials have been installed and inspected.
- 3.4.10 Whenever the contract documents require delivery by the Contractor of any materials, equipment, or other items, the term delivery shall be deemed to include unloading and storing with proper protection where directed.
- 3.4.11 All work shall be executed in a thorough, substantial, and workmanlike manner, and in complete accordance with the manufacturers most recent recommendations unless otherwise specified or permitted by the Architect/Engineer. Sufficient competent workmen, foremen, and superintendents shall be employed at all times to permit the work to be pursued with diligence until completion.
- 3.4.12 Each Contractor shall perform all necessary labor to install his work within the terms of his contract. The Owner assumes no responsibility for any additional expense due to so called "overtime" work.

- 3.4.13 Materials shall be applied or installed under proper climatic conditions when they may be affected by temperature, moisture, humidity, or dust.
- 3.4.14 All work shall be installed so as to be readily accessible for operation, maintenance, inspection, and repair. Minor deviations from the drawings may be made to accomplish this, but changes of magnitude or changes involving increased cost, shall not be made without authorization as provided under the contract.
- 3.4.15 As defined by federal and state laws, no materials incorporated into the project work shall contain asbestos. The Contractor shall submit written certifications stating compliance with this requirement, from each primary supplier and manufacturer.

### 3.5 WARRANTY

ADD the following subparagraph 3.5.2 reading:

The contractor shall provide and execute the general one year warranty.

### 3.8 ALLOWANCES

CHANGE entire subparagraph 3.8.1 to read and DELETE 3.8.2 and 3.8.3 in its entirety.

- 3.8.1 There are no contingency allowances in the contract sum.

### 3.11 DOCUMENTS AND SAMPLES AT THE SITE

CHANGE entire subparagraph 3.11.1 to read:

- 3.11.1 The Contractor shall maintain one record set of drawings, specifications, addenda, change orders, allowance adjustments, approved shop drawings, product data, samples, construction and submittal schedules, and similar required submittals at the project site, in good order and condition. He shall mark these documents on a daily basis to record all approved changes, and to record the dimensional locations of his installed work if it deviates from that shown on contract and/or shop drawings.

Particular attention shall be given to site utilities, the location of valves, equipment, and major electrical conduits.

ADD the following subparagraphs 3.11.2 and 3.11.3, reading:

- 3.11.2 The Owner's Project Representative will provide and store one set of record drawings in his site office, in the form of mylar reproduces. Each month, the Contractor shall access the reproducible drawings and transcribe their records of approvals and as-built deviations thereon.
- 3.11.3 Prior to submitting his final Application for Payment, the Contractor shall confirm that all changes and deviations have been recorded on the reproducible drawings, and indicate such by marking each drawing "Record Document" and applying his signature and the date. At the same time, the Contractor shall submit revised shop drawings which reflect any changes or deviations in the installed work. These shall be delivered to the Architect/Engineer.

### 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

ADD one sentence to end of subparagraph 3.12.6 reading:

Submittals not exhibiting the Architect's/Engineer's review stamp and which are not marked "No Exceptions Taken" or "Make Corrections Noted" shall not be used at the project.

ADD the following subparagraphs 3.12.11 through 3.12.17:

- 3.12.11 The Contractor shall not duplicate the Architect's/ Engineer's documents for preparation of any submittals.
- 3.12.12 Clearly identify all submittals by indicating project name, specification division, or section number name, and names of the Contractor, sub-contractor and manufacturer.
- 3.12.13 Provide four (4) copies of each submittal. After the Architect's/Engineer's review is finished, distribute sufficient copies for the proper execution of the work to Sub-contractors, suppliers, and as follows:
  - A. Architect: one copy
  - B. Owner: one copy
- 3.12.14 The Contractor shall check, mark up if required, and indicate his approval and date of approval before submitting to Architect/Engineer. The Architect/Engineer may return submittals not so marked by the Contractor.
- 3.12.15 Submittals which show items not applicable to the project shall be clearly marked to show which item is being submitted for approval.
- 3.12.16 For the Owner's records, submit duplicate copies of permits, licenses, certifications, tests, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established for compliance with standards and regulations.
- 3.12.17 Provide certificates from all primary suppliers and manufacturers stating that all materials are asbestos free as defined by current state and federal laws and regulations.

### 3.13 USE OF SITE

ADD the following subparagraphs 3.13.2, 3.13.3 and 3.13.4 reading:

- 3.13.2 Prior to start of work, meet with the Owner, and/or the Owner's Representative to determine acceptable staging areas, storage, equipment and parking areas for the Contractor's employees.
- 3.13.3 The Contractor shall coordinate with the Owner to determine acceptable construction staging areas in the vicinity of the project. The Contractor must coordinate with the Owner on the use of these staging areas.
- 3.13.4 Maintain all building and site exits in safe and operable condition. Provide and maintain warning signs, lights, barricades, fencing, and other devices to protect people and property.

### 3.14 CUTTING AND PATCHING

ADD the following subparagraphs 3.14.3 through 3.14.5 reading:

- 3.14.3 The Contractor shall provide all excavation, backfill and compaction of backfill for its own work as required to properly accommodate its work, unless specifically stated to the contrary. This does not relieve the Contractor from responsibilities stated in Article 6 of the General Conditions.
- 3.14.4 Cutting of rough work shall be done by the Contractor requiring the work to be cut. Cutting of

finish work shall be done by the Contractor installing the finish work to be cut. All cutting and/or patching shall be done by the Contractor who installed the work which is to be cut and/or patched, and paid for by the Contractor who failed to give advance notice or who made the cutting necessary.

- 3.14.5 Cutting and patching of existing work which is to remain shall be done by the trade who normally installs such work as is to be cut or patched, and paid for by the Contractor who made the cutting necessary.

ADD the following paragraphs 3.19 and 3.20 reading:

3.19 NONDISCRIMINATION

During the performance of the work, the Contractor agrees to conduct his operations in accordance with the attached federal labor standards and requirements of Title VI of the Civil Rights Act of 1964 and or the Rehabilitation Act of 1973, as amended. The Contractor further agrees as follows:

The Contractor will not discriminate against employees or applicants for employment because of race, creed, color, national origin, sex, age, disability or marital status and will undertake programs or affirmative action to insure that they are afforded equal employment opportunities without discrimination. Such action shall be taken with reference, but not be limited to: recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, or termination, rates of pay or other forms of compensation and selection for training or retraining, including apprenticeship and on-the-job training.

If the Contractor is directed to do so by the contracting agency or the Owner, the Contractor shall request each employment agency, labor union, or authorized representative of workers with which he has a collective bargaining or other agreement or understanding, to furnish him with a written statement that such employment agency, labor union or representative will not discriminate because of race, color, creed, national origin, sex, age, disability or marital status, and that such union or representative will affirmatively cooperate in the implementation of the Contractor's obligations hereunder.

The Contractor will state, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, that all qualified applicants will be afforded equal employment opportunities without discrimination because of race, color, creed, national origin, sex, age, disability or marital status. The Contractor will comply with all the applicable provisions of Title VI of the Civil Rights Act of 1964 and Rehabilitation Act of 1973 as amended, and of rules, regulations and orders issued pursuant thereto and will furnish all information and reports required by said acts of such rules, regulations and orders, and will permit access to its books, records and accounts and to its premises by the Owner for the purpose of ascertaining compliance with said acts and such rules, regulations and orders.

If the Contractor does not comply with the equal opportunity provisions of this Agreement, with the applicable provisions of said acts, or with such rules, regulations or orders, this Agreement or any portion thereof, may be canceled, terminated, or suspended or payments thereon withheld, in accordance with the applicable provisions authorized in said acts, and such other sanctions may be imposed and remedies invoked as are provided in said acts or by rule, regulation or order issued pursuant thereto, or as otherwise provided by law.

The Contractor will include the provisions of the above clauses and all applicable contract provisions promulgated pursuant to Title VI of the Civil Rights Act of 1964 and Rehabilitation Act of 1973, as amended in every non-exempt subcontract or purchase order in such a manner that such provisions will be binding upon each Subcontractor or vendor as to its work force. The Contractor will take such action in enforcing such provisions of such subcontract or

purchase order as the Owner may direct, including sanctions or remedies for non-compliance. If the Contractor becomes involved in or is threatened with litigation with a Subcontractor or vendor as a result of such direction, the Contractor shall promptly so notify the Attorney General, requesting him to intervene.

### 3.20 AFFIRMATIVE ACTION

The Contractor agrees, in addition to any other non- discrimination provisions of the contract that the Contractor shall comply fully with and shall cooperate in the implementation of any Affirmative Action Requirements for Equal Employment Opportunity required by the Owner, at no additional cost to the Owner. Any such provisions of the Contract shall be incorporated in their entirety in all subcontracts of any tier.

The Affirmative Action programs referred to in this contract shall apply to the entire work force of the Contractor during the performance of this Contract.

These provisions shall be deemed supplementary to, and not in lieu of, the nondiscrimination provisions required by applicable Federal, State or local laws.

The Contractor shall file, and to cause each of its sub- Contractors to file, such periodic compliance reports as the Commissioner of Human Rights may prescribe by rule or regulation or as required by the Owner. The Contractor shall keep and maintain such records pertaining to its employment practices as the Commissioner of Human Rights may prescribe by rule or regulation or as required by the Owner and shall cause its Subcontractors to keep and maintain such records.

## **ARTICLE 4 ADMINISTRATION OF THE CONTRACT**

### 4.1 ARCHITECT

ADD the following subparagraph 4.1.4 reading:

- 4.1.4 The Architect is: Saratoga Associates, Landscape Architects, Architects, Engineers and Planners, P.C. 21 Congress Street, Saratoga Springs, NY 12866, or its authorized representative, herein referred to as Architect, Architect/Engineer, Architect or Engineer, Project Representative, Owner's project representative or Owner's Representative.

### 4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT

- 4.2.1 DELETE words in first sentence reading "... and (3) with the Owner's concurrence, from time to time during the one year period for correction of work described in Paragraph 12.2."

CHANGE entire subparagraph 4.2.2 to read:

- 4.2.2 A consultant or its sub-consultants, will provide full time on-site inspection during the construction project to ensure that work is completed in accordance with the contract documents. The consultant shall keep the Owner informed of the progress of the work, and shall attempt to guard the Owner against defects and deficiencies in the work.

## **ARTICLE 7 CHANGES IN THE WORK**

### 7.1 CHANGES

ADD the following subparagraphs 7.1.4 through 7.1.7 reading:

- 7.1.4 Throughout article seven (7), the allowance for overhead and profit combined, included in the

total cost to the Owner, shall be based on the following schedules:

- .1 For the Contractor, for any work performed by the Contractor's own forces, fifteen percent (15%) of the cost.
- .2 For the Contractor, for work performed by his Sub-contractor, ten percent (10%) of the amount due the Subcontractor
- .3 For each Subcontractor, or Subcontractor involved, for any work performed by that Contractor's own forces, fifteen percent (15%) of the cost.
- .4 For each Subcontractor, for work performed by his Sub-subcontractors, five percent (5%) of the amount due the Sub-subcontractor.
- .5 Cost to which overhead and profit is to be applied shall be determined in accordance with sub-subparagraphs 7.3.6.1, 7.3.6.2, 7.3.6.3, and 7.3.6.5

7.1.5 The Contractor shall prepare and submit to the Architect/ Engineer quotations for all claims, extra work, or credits, which would result in an adjustment to the contract sum, and preparation of related Change Orders and Construction Change Directives. All quotations shall be accompanied by a complete itemization of costs, including labor (type, quantity and unit cost per hour), materials (type, quantity and unit cost) and copies of written quotations from Subcontractors itemized in the same manner.

7.1.6 For work performed under a time and material directive, the Contractor shall furnish to the Owner's Project Representative, at the end of each day, the number of hours of labor expended each day; use, if any, of all equipment; and invoices and delivery slips for any materials received for the work and which will become a permanent part of the work.

7.1.7 For Change Order and Change Directive work, overhead shall be deemed to include the cost of insurance, bonds, and similar contract requirements.

### 7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.6 In the first sentence, DELETE the words, "a reasonable allowance for overhead and profit" and SUBSTITUTE "an allowance for overhead and profit in accordance with the schedule set forth in new subparagraph 7.1.4, above."

## **ARTICLE 9 PAYMENTS AND COMPLETIONS**

### 9.2 SCHEDULE OF VALUES

CHANGE entire subparagraph 9.2.1 to read:

9.2.1 The Contractor shall furnish, at least 21 days in advance of submission of their first monthly application for payment, a detailed schedule of values showing prices of all material and labor items included in the contract, the total of which shall aggregate the contract sum and as a breakdown by funding source in the amount not to exceed the total grant received from each funding source. The project representative will provide a breakdown of the amount by funding source for the purpose of complying with these requirements. This estimate shall be submitted using AIA Document G703 (1983 edition only), supported by such evidence of its correctness as the Architect/Engineer may direct. This evidence may include certified copies of subcontracts.

The Architect/Engineer shall have the right to revise the estimate as may be deemed necessary to make the various items conform to their true value.

The approved schedule shall be used as a base for all Applications for Payment and may be used for computing additions to and deductions from the contract price made necessary by change orders.

Profit and overhead shall not be listed as separate items, but their amounts shall be distributed pro-rata throughout the estimate.

The cost of General Conditions, bonds, insurance, and project clean-up shall each be listed separately from overhead costs.

### 9.3 APPLICATIONS FOR PAYMENT

CHANGE entire subparagraph 9.3.1 to read:

- 9.3.1 At least ten (10) days before the date established for each progress payment, the Contractor shall submit to the Owner's Project Representative an itemized Application for Payment for operations completed in accordance with the approved schedule of values. Such application shall be notarized and supported by such data substantiating the Contractor's right to payment as the Owner or Architect/Engineer may require, such as copies of requisitions from Subcontractors and material suppliers, and reflecting retainage provided for elsewhere in the Contract Documents.

Contractor shall submit certified payroll with all payment applications.

ADD sub-subparagraph 9.3.1.3 reading:

- 9.3.1.3 Payments will be made equaling, in the opinion of the Owner and the Architect/Engineer, 95% of the value of work completed. Retainage will be 5%. The Contractor must submit two (2) copies of Contractors and subcontractors certified payroll with the application for payment. Payment requests approved by the Architect/Engineer will be forwarded to Town of Saratoga - On behalf of Historic Hudson & Hoosic Rivers Partnership for payment.

### 9.4 CERTIFICATES FOR PAYMENT

CHANGE the first sentence in subparagraph 9.4.2 to read:

- 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect/Engineer to the Owner, based on the Architect's/Engineer's observations at the site and the data comprising the Application for Payment, that the work has progressed to the point indicated and that, to the best of the Architect's/Engineer's knowledge, information and belief, the work appears to be in accordance with the contract documents.

## **ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY**

### 10.2 SAFETY OF PERSONS AND PROPERTY

ADD the following sentences to subparagraph 10.2.2, reading:

Such laws and regulations will be deemed to be included in the Contract Documents the same as though herein written out in full. Notwithstanding any reference to said laws, orders, rules and regulations, the Architect/Engineer and the Owner will not be responsible for supervision and construction methods or procedures, or protection of persons and property.

### 10.3 HAZARDOUS MATERIALS

CHANGE the phrase "...from a material or substance, including..." in the first and second line of sub-paragraph 10.3.1 to read "...from a material or substance previously not identified under the remedial investigation work for this project, including...".

CHANGE the phrase "...a material or substance reported by the Contractor..." in the first and second line of sub-paragraph 10.3.2 to read "from a material or substance, previously not identified under the remedial investigation work for this project, reported by the Contractor...".

## **ARTICLE 11 INSURANCE AND BONDS**

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

CHANGE the following sub-subparagraphs 11.1.1 and 11.1.2 as follows:

11.1.1.1 DELETE semicolon at the end of clause 11.1.1 and ADD:  
...including claims for private entities performing work at the site and exempt from the coverage on account of number of employees or occupation, which entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the project;

11.1.1.2 DELETE semicolon at the end of clause 11.1.2 and ADD:  
...including claims for persons or entities excluded by statute from the requirements of clause 11.1.1.1 but required by the contract documents to provide the insurance required by that clause;

ADD the following sub-subparagraph 11.1.2.1 reading:

11.1.2.1 The Contractor shall procure, pay for and maintain during the life of the contract, the following insurances:

<u>COVERAGE</u>	<u>NAMED INSURED OR ADDITIONAL INSUREDS</u>	<u>LIMITS</u>
1. <u>Workmen's Compensation</u>	Contractor	Statutory
2. <u>Employer's Liability</u>	Contractor	\$1,000,000
3. <u>Public Liability</u> (inc. Contractual) Bodily Injury	Contractor Town of Saratoga	\$1,000,000 Each Occurrence \$3,000,000 Aggregate
4. <u>Comprehensive General Liability</u> Bodily Injury Property Damage (including Broad Form Endorsement)	Contractor Subcontractor Town of Saratoga	\$1,000,000 Each occurrence \$3,000,000 Aggregate
5. <u>Comprehensive Auto- mobile Liability</u> Bodily Injury Property Damage	Contractor Subcontractor Town of Saratoga	\$1,000,000 Each occurrence \$1,000,000 Aggregate
6. <u>Owner's Protective Liability</u> Bodily Injury and	Town of Saratoga the Architect, and all	\$1,000,000 Each occurrence \$3,000,000



Property Damage	their employees	Aggregate
7. <u>Umbrella/Excess Liability</u> (not necessary for form to be "pure" umbrella)	Contractor, Town of Saratoga, the Architect and all their employees	\$2,000,000 Each occurrence \$2,000,000 Aggregate

Three certificates of insurance for each policy shall be submitted to the Architect/Engineer, and construction activities shall not commence before the Owner is free of possible loss. If the Owner is damaged or subject to loss due to the failure of the Contractor to obtain and maintain such insurance, then the Contractor shall bear all costs and responsibilities attributable thereto.

Certificates shall be accompanied by a statement of any exclusions in the policy.

The Contractor must provide to the Architect 30 days written notice prior to change or cancellation of policies. The Contractor must give prompt written notice of an accident or claim to the Architect as well as to its insurer. Such notice must be given within the period established by the policy for giving notice. The insurance provider must be authorized to do business in New York State.

The Contractor shall exhibit any and all policies within three days of demand by Owner or Architect/Engineer.

A copy of the requirements for insurance set forth herein shall be forwarded to Contractor's insurance carrier to ensure that required coverage is provided.

#### 11.1.3 CERTIFICATES OF INSURANCE

ADD the following sub-subparagraph 11.1.2.1 reading:

11.1.3.1 The Contractor shall submit a CG20 form with certificates of insurance.

#### 11.3 PROPERTY INSURANCE

CHANGE first line of subparagraph 11.3.1 reading:

"Unless otherwise provided, the Owner shall purchase and maintain,..." to read "Unless otherwise provided, the Contractor shall purchase and maintain,...". (balance of subparagraph unchanged)

11.3.1 DELETE sub-sub-paragraph 11.3.1.2 in its entirety.

ADD the following sub-subparagraph 11.3.1.6 reading:

11.3.1.6 The insurance required by paragraph 11.3 is not intended to cover machinery, tools or equipment owned or rented by the Contractor which are utilized in the performance of the Work but not incorporated into the permanent improvements. The Contractor shall, at the Contractor's own expense, provide insurance coverage for owned or rented machinery, tools or equipment which shall be subject to provisions of subparagraph 11.3.7.

11.3.7 ADD the following sub-subparagraph 11.3.1.7 reading:

11.3.1.7 Owner and Contractor intend that any policies provided in response to the insurance provisions shall protect all of the parties insured and provide primary coverage for all losses and damages caused by the perils covered thereby. Accordingly, all such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any of the parties named as insureds or additional insureds.

11.4.1 CHANGE paragraph 11.4.1 to read:

Performance, Labor and Material Bond: The Owner, prior to the execution of the contract, requires the successful bidder to furnish bonds covering the faithful performance of the contract and payment of all obligations arising thereunder in such form and amount as the Owner may prescribe and with such sureties underwritten by a surety company licensed to do business in New York State. The premiums shall be paid by the Contractor. The required bonds shall be delivered to the Owner not later than the date of the execution of the contract. The dollar value of such bonds shall equal one hundred percent (100%) of the sum of the actual amount of the Owner/Contractor Agreement executed. The value of the bonds shall be adjusted upward or downward if and as the contract value is affected by contract amount changes during the course of the contract.

### **ARTICLE 13 MISCELLANEOUS PROVISIONS**

ADD the following paragraph title:

#### **13.8 CONTRACTOR'S PROJECT RECORDS AND DOCUMENTS**

ADD subparagraph 13.8.1 reading:

13.8.1 The Owner and Architect/ Engineer reserve all rights to inspect and obtain copies, at any time, of all the Contractor's original internal records and documents which relate in any way to this project.

### **ARTICLE 15 CLAIM AND DISPUTES**

#### **15.3 MEDIATION**

DELETE paragraph 15.3 in its entirety.

#### **15.4 ARBITRATION**

DELETE paragraph 15.4 in its entirety.

### **ADD THE FOLLOWING ARTICLES:**

### **ARTICLE 16 FORMS TO BE USED FOR THIS PROJECT**

15.1 The forms listed here shall be used for the work of this project. Bidders and Contractors shall make themselves aware of the form and content of these documents. These forms shall be deemed to be included in the Contract Documents the same as though they were bound herein.

Instructions to Bidders - AIA Document A701 - 1997 (electronic format) with Supplementary Instructions  
Contractor's Qualification Statement - AIA Document A305 - 1986  
Bid Bond, AIA Document A310 - 2010  
Performance Bond, Labor and Material Payment Bond, AIA Document A312 - 2010  
Certificate of Insurance - AIA Document G705 - 1987  
Owner/Contractor Agreement - AIA Document 101 - 2007 (electronic format) as modified by Owner  
General Conditions of the Contract for Construction - AIA Document A201 - 2007 (electronic format)  
Application and Certificate for Payment - AIA Document G702 as modified, and AIA Document G703 - 1983  
Change Order - AIA Document G701 - 1978

Construction Change Directive - AIA G714 - 1987  
Certificate of Substantial Completion - AIA Document G704 - 1987  
Contractor's Affidavit of Payment of Debts and Claims - AIA Document G706 - 1970  
Contractor's Affidavit of Release of Liens - AIA Document G706A - 1970  
Consent of Surety Company to Final Payment - AIA Document G707 - 1970

- 15.2 The pre-printed unmodified forms are available at most stationery supply retailers and the American Institute of Architects (AIA). A sample copy will be provided by the Architect/Engineer upon request. Modified forms are available from the Owner or Architect/Engineer, as noted.

## **ARTICLE 17 EQUIVALENTS**

The Contractor represents that his contract price is based on the materials and equipment described in the contract documents.

It is not the intention of the Owner to restrict or bar equal or superior products of other manufacturers by the specification of a particular name and model number. Specific reference in the project documents to any product, material, fixture, form, type of construction, equipment, appurtenances, furniture or any other item to be incorporated into the work or to be used in connection therewith by proprietary name, trade name, brand name, or name of manufacturer or catalogue number is made to establish a standard of required function, dimension, quality, performance, design appearance, workmanship and suitability for the purpose intended, and shall not be construed as limiting competition.

Where two or more are named, these are presumed by the Architect/ Engineer to be equal and the Contractor may select one of those items. If the Contractor had desired to use any kind, type, brand, or manufacturer of material other than that named in the specification, he shall have indicated in writing in his bid proposal form what other kind, type, brand, or manufacturer was included in the bid for the specific specified item and, when requested, have submitted information describing wherein it differs from the project specification in specific detail, and other information as required by the Architect/Engineer to perform a reasonable and fair evaluation of the proposal.

The Owner and Architect/Engineer shall be under no obligation to consider proposals for substitutions or changes to specified materials or equipment following receipt of bids or execution of the Owner/Contractor Agreements.

Should the Architect/Engineer elect to consider and/or evaluate a proposed equivalent after submission of bids, the proposer shall provide drawings, design data, performance and test data and other information deemed necessary by the Architect/Engineer for the evaluation. A statement setting forth any changes in other materials or equipment that incorporation of the equivalent would require shall be included. The burden of proof of the merit of the proposed equivalent is upon the proposer.

Where any article or thing in the Contract Documents is specified by a proprietary name, a trade name, or the name of a manufacturer, with the addition of the expression "or (approved) equal," it is understood: (1) that the Architect/Engineer, acting as the Owner's Representative, will use his sole judgment in determining whether or not any article proposed as an equivalent is an equal of any article specified herein; (2) that the decision of the Architect/Engineer on all such questions of equality shall be final; and (3) that in the event of any adverse decision by the Architect/Engineer, acting as the Owner's Representative, no claim of any sort shall be made or allowed against the Architect/Engineer or the Owner by the manufacturer, jobber, or other supplier of the articles involved.

## **END OF SUPPLEMENTARY CONDITIONS**

**DOCUMENT 00 8300**

**GENERAL ONE YEAR GUARANTEE**

Town of Saratoga - On behalf of Historic Hudson & Hoosic Rivers Partnership  
Gateway Visitor Center  
Bid No. \_\_\_\_\_

STATE OF NEW YORK  
COUNTY OF \_\_\_\_\_

CONTRACT NO. \_\_\_\_\_

\_\_\_\_\_,  
(typed name)

\_\_\_\_\_  
(title)

representing

\_\_\_\_\_  
(company name)

\_\_\_\_\_  
(address)

being duly sworn, says:

- That he knows the terms, conditions and requirements of the Owner/Contractor Agreement and the Contract Documents.
- That under the terms of that Agreement and the Documents, he guarantees that all work has been accomplished in accordance with that Agreement and the Documents, and that such work is free of defective workmanship and materials.
- That under the terms of the Agreement and Documents, he guarantees to repair at his own cost all work covered by the Contract Documents that may be determined defective by the Owner's Representative or Owner within a period of one (1) year from the date of SUBSTANTIAL COMPLETION as established by the Owner's Representative's certificate of same.
- That during this period, he will pay the cost of repairs to other work damaged by the defects of his work, and also the cost of replacing other work that may be disturbed I making such repairs.
- That he agrees to promptly repair all defects upon notice by the Owner, and at a time convenient to the Owner.

**END OF SECTION**



**REQUIREMENTS OF ARTICLE 8 (Section 220-223)  
AND ARTICLE 9 (Section 230 - 239)  
OF THE NEW YORK STATE LABOR LAW**

**PREVAILING RATE SCHEDULE:**

The Labor Law requires public work contractors and subcontractors to pay laborers, workers or mechanics employed in the performance of a public work contract not less than the prevailing rate of wages and to provide supplements (fringe benefits) in accordance with the prevailing practices in the locality where the work is performed.

The Department of Jurisdiction awarding a public work contract **MUST** obtain a prevailing rate schedule from the Bureau of Public Work of the New York State Department of Labor listing the hourly rates for the trades and the occupations of the workers to be employed on the public work project. This schedule may be obtained by completing and forwarding the Request for Wage and Supplement Information on the reverse side hereof. The prevailing rate schedule **MUST** be included in the specifications for the contract to be awarded and is deemed part of the public work contract. Upon the signing of the contract, the Department of Jurisdiction **MUST** advise the Bureau of Public Work on a form supplied by the Bureau as to the name of the contractor to whom the contract was awarded, the date and the amount of the contract.

A "Department of Jurisdiction" includes a state department agency, board or commission; a county, city, town or village; a school district, board of education or board of cooperative educational services; a sewer, water, fire, improvement and other district corporation, a public benefit corporation; and a authority awarding a public work contract.

**WITHHOLDING OF PAYMENTS FROM CONTRACTORS:**

When the Bureau of Public Work finds that a contractor or subcontractor on a public work project failed to pay or provide the requisite prevailing wages or supplements, the Bureau is authorized by Sections 220-b and 235.2 of the Labor law to so notify the financial officer of the Department of Jurisdiction that awarded the public work contract. Such officer **MUST then withhold or cause to be withheld from any payment due the prime contractor on account of such contract the amount indicated by the Bureau of Public Work as sufficient to satisfy the unpaid wages and supplements, including interest and any civil penalty that may be assessed by the Commissioner of Labor.**

The Department of Jurisdiction shall comply with an order of the Commissioner of Labor or of the Court with respect to the release of the funds so withheld.

## **SECTION 01 1000**

### **SUMMARY**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES:**

- A. Summary of Work
- B. Contract description
- C. Project schedule
- D. Site use restrictions
- E. General quality control
- F. Security and protection
- G. Existing utilities and services
- H. Disposal of materials
- I. Material storage
- J. Noise

##### **1.02 SUMMARY OF WORK**

The General Contractor's scope of work shall include, but not be limited to:

- 1. Excavation for and installation of a concrete building foundation and micropiles.
- 2. Construction of a two story timber frame building.
- 3. Grading as required for building construction.
- 4. Installation of pavements for building access.
- 5. Temporary construction entrance from reds road.
- 6. Installation of connections to existing on-site utilities, including but not limited to water supply, sewer, electrical, natural gas, and communications.

The work of this contract shall be completed as shown or described on the following contract documents:

#### **DIVISION 01 -- GENERAL REQUIREMENTS**

- 01 1000 Summary
- 01 2000 Price and Payment Procedures
- 01 3000 Administrative Requirements
- 01 3300 Submittal Procedures
- 01 4000 Quality Requirements
- 01 4533 Special Inspections & Structural Test
- 01 5000 Temporary Facilities and Controls
- 01 6000 Product Requirements
- 01 7000 Execution Requirements

#### **DIVISION 02 -- EXISTING CONDITIONS**

#### **DIVISION 03 -- CONCRETE**

- 03 3000 – Cast-in-Place Concrete
- 03 3020 – Concrete Slab on Grade



03 4500 – Precast Architectural Concrete

**DIVISION 04 – MASONRY**

04 4313 – Building Stone Veneer

**DIVISION 06 -- WOOD, PLASTICS, AND COMPOSITES**

06 1000 – Rough Carpentry

06 1200 – Structural Insulated Panels

06 1324 – Heavy Timber Framing

06 1500 – Wood Decking

06 2000 – Finish Carpentry

**DIVISION 07 -- THERMAL AND MOISTURE PROTECTION**

07 1400 – Fluid-Applied Waterproofing

07 2100 – Thermal Insulation

07 2200 – Ventilated Nailbase Insulation Panels

07 3113 – Asphalt Shingles

07 4623 – Wood Siding

07 8400 – Firestopping

07 9005 – Joint Sealers

**DIVISION 08 -- OPENINGS**

08 1416 – Wood Doors and Frames

08 3100 – Access Doors and Panels

08 4113 – Aluminum-Framed Entrances and Storefronts

08 5200 – Wood Windows

08 7100 – Finish Hardware

**DIVISION 09 -- FINISHES**

09 2116 – Gypsum Board Assemblies

09 3000 – Tiling

09 5100 – Suspended Acoustical Ceilings

09 6429 – Wood Plank Flooring

09 6723 – Resinous Flooring

09 6800 - Carpeting

09 9000 – Painting and Coating



**DIVISION 10 -- SPECIALTIES**

- 10 1400 – Signage
- 10 2813 – Toilet, Bath and Laundry Accessories
- 10 4400 – Fire Protection Specialties

**DIVISION 12 -- FURNISHINGS**

- 12 3600 – Countertops

**DIVISION 21 -- FIRE SUPPRESSION**

- 21 0500 – Common Work Results For Fire Suppression
- 21 0523 – General-Duty Valves For Water-Based Fire-Suppression Piping
- 21 0553 – Identification For Fire Suppression Piping And Equipment
- 21 1300 – Fire Suppression Sprinklers

**DIVISION 22 -- PLUMBING**

- 22 0513 – Common Motor Requirements For Plumbing Equipment
- 22 0548 – Vibration And Seismic Controls For Plumbing Piping And Equipment
- 22 0553 – Identification For Plumbing Piping And Equipment
- 22 0719 – Plumbing Piping Insulation
- 22 1005 – Plumbing Piping
- 22 1006 – Plumbing Piping Specialties
- 22 3000 – Plumbing Equipment
- 22 4000 – Plumbing Fixtures

**DIVISION 23 – HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)**

- 23 0513 – Common Motor Requirements For Hvac Equipment
- 23 0548 – Vibration And Seismic Controls For Hvac Piping And Equipment
- 23 0553 – Identification For Hvac Piping And Equipment
- 23 0593 – Testing, Adjusting, And Balancing For Hvac
- 23 0713 – Duct Insulation
- 23 2300 – Refrigerant Piping
- 23 3100 – Hvac Ducts And Casings
- 23 3300 – Air Duct Accessories
- 23 3416 – Centrifugal Hvac Fans

23 3700 – Air Outlets And Inlets  
23 5400 – Furnaces  
23 8101 – Terminal Heat Transfer Units  
23 8127 – Small Split-System Heating And Cooling  
23 8216 – Air Coils

**DIVISION 26 -- ELECTRICAL**

26 0519 – Low-Voltage Electrical Power Conductors And Cables  
26 0526 – Grounding And Bonding For Electrical Systems  
26 0529 – Hangers And Supports For Electrical Systems  
26 0534 – Conduit  
26 0537 – Boxes  
26 0553 – Identification For Electrical Systems  
26 0923 – Lighting Control Devices  
26 2416 – Panelboards  
26 2726 – Wiring Devices  
26 2813 – Fuses  
26 2818 – Enclosed Switches  
26 2913 – Enclosed Controller  
26 4113 – Lightning Protection for Structures  
26 4300 – Surge Protective Devices  
26 5100 – Interior Lighting  
26 5600 – Exterior Lighting

**DIVISION 27 – COMMUNICATIONS**

271005 – Structured Cabling For Voice And Data - Inside-Plant

**DIVISION 28 – ELECTRONIC SAFETY AND SECURITY**

28 3100 – Fire Detection and Alarm

**DIVISION 31 -- EARTHWORK**

31 1000 – Soil Materials  
31 1100 – Aggregate Materials

- 31 1200 – Site Demolition and Clearing
- 31 2200 – Earthwork and Site Grading
- 31 2301 – Excavation, Backfill, and Compaction (Building Area)
- 31 2501 – Erosion and Sediment Control
- 31 6333 – Drilled Micropiles

## **DIVISION 32 -- EXTERIOR IMPROVEMENTS**

- 32 1123 - Aggregate Base Courses
- 32 1316 – Concrete Pavement
- 32 1318 – Asphalt Pavement
- 32 1320 – Stone Dust Walk
- 32 1322 – Painted Pavement Markings
- 32 1801 – Aluminum Edging
- 32 1860 – Site Furnishings
- 32 9218 – Landscape Grading
- 32 9219 – Seeding
- 32 9220 – Landscape Planting

## **DIVISION 33 -- UTILITIES**

- 33 1116 – Site Water Distribution
- 33 1300 – Disinfection of Water Line
- 33 3111 – Sanitary Sewer System
- 33 4111 – Storm Water Management System

## **LIST OF CONSTRUCTION DRAWINGS**

- |       |  |
|-------|--|
| G100  | Cover Sheet                                  |
| G101  | General Information                          |
| LS100 | Life Safety Plan                             |
| L100  | Existing Conditions and Site Demolition Plan |
| L200  | Layout and Materials Plan                    |
| L300  | Grading, Drainage and Utility Plan           |
| L400  | Planting Plan                                |
| L500  | Site Details                                 |
| L501  | Utility Details                              |
| A100  | Lower Level Plan and Details                 |
| A101  | Main Level Plan and Details                  |
| A102  | Mezzanine Plan                               |
| A103  | Lower Level – Reflected Ceiling Plan         |
| A104  | Main Level – Reflected Ceiling Plan          |
| A105  | Mezzanine – Reflected Ceiling Plan           |

A106	Roof Plan and Details
A200	Building Elevations
A300	Building Sections
A400	Stairs and Railings
A500	Wall Sections
A600	Building Details
A601	Desk Details
A700	Interior Elevations and Finish Schedule
A800	Doors and Windows
S001	General Notes
S002	General Notes Continued
S003	Schedule of Special Inspections
S100	Foundation Plan
S200	Load Diagrams
S300	Foundation Sections and Details
S301	Foundation Sections and Details
S500	Framing Sections and Details
M000	Legend
M001	Schedules
M100	Lower Level Mechanical Floor Plan
M101	Main Floor Mechanical Floor Plan
M200	Details
M300	Controls
P000	Plumbing General Information
P001	Schedules
P100	Lower Level Plumbing Floor Plan
P101	Main Floor Plumbing Floor Plan
P200	Details
P201	Plumbing Isometrics
FP100	Site Plan, Legend, Notes, & Schedules
FP101	Details – Fire Protection
FP102	Lower Level Floor Plan - Fire Protection
FP103	Main Floor Plan - Fire Protection
FP104	Mezzanine Floor Plan - Fire Protection
FP105	Sections – Fire Protection
FP106	Sections – Fire Protection
FP107	Sections – Fire Protection
E000	Electrical Notes & Details
E050	Site Electrical Plan
E100	Lower Level Power & Telecom Plan
E101	Main Level Power & Telecom Plan

E102	Mezzanine Level Power & Telecom Plan
E103	Lower Level Lighting & Fire Alarm Plan
E104	Main Level Lighting & Fire Alarm Plan
E105	Mezzanine Level Lighting & Fire Alarm Plan
E106	Details & One-Line Riser Diagram
E107	Fire Alarm Riser Diagram
E108	Lightning Protection Plan
E109	Lightning Protection Details

*TF-0.0	Project Overview 1
*TF-0.1	Project Overview Main Frame 1
*TF-0.2	Project Overview Main Frame 2
*TF-0.3	Project Overview Exterior 1
*TF-0.4	Project Overview Exterior 2
*TF-0.5	Engineering Data (Forthcoming)
*TF-1.00	Post Plan Lower Level
*TF-1.01	Post Plan Main
*TF-1.02	Framing Plan Main
*TF-1.1	Bent 1
*TF-1.2	Bent 2
*TF-1.3	Bent 3
*TF-1.4	Bent 4
*TF-1.5	Bent 5
*TF-1.6	Bent 6
*TF-1.7	Bent 7
*TF-2.1	Bent 7
*TF-2.2	Bent 7
*TF-2.3	Bent 7
*TF-2.4	Bent 7
*TF-3.0	Framing Plan Loft
*TF-3.1	Roof Plan
*TF-5.0	Exterior Bent 1 and 2
*TF-5.1	Exterior Wall A and B
*TF-5.2	Exterior Bent 3 and 4
*TF-5.3	Exterior Wall C and D
*TF-5.4	Exterior Bent 5, 6, 7, 8
*TF-5.5	Exterior Wall E and F

**\*Note: For reference only - Not for construction.**

### **1.03 CONTRACT DESCRIPTION**

The work is part of a multiple (Wicks Law) stipulated lump sum contract. Working from lines and levels established by the contract drawings, the Contractor shall establish and maintain benchmarks and other dependable markers to set the lines and levels to properly locate every element of the work of the entire project. All benchmarks and markers shall be carefully maintained and periodically checked. It is solely the responsibility of the Contractor to replace or correct damaged or displaced markers caused by his actions.

The Contractor shall assume full responsibility for complete accuracy of all work under this contract so the intent of the drawings and specifications will be realized in the completed work. Rectify and/or replace any work, which does not comply with layouts shown and/or specified. Examine grading work completed under the contract, and report any apparent discrepancy in alignment, elevation or stability to the Owner's Representative. Assist sub-contractors in determining proper location for their work.

### **1.04 PROJECT SCHEDULE**

Project work shall commence about on June 6, 2016. The date of Substantial Completion of the work is February 10, 2017. 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 the Owner can utilize the work for its intended use.

The approximate date of Final Completion of work is May 1, 2017. The Contractor has the responsibility of completing the work within the scheduled time as set forth in the project schedule.

The project schedule shall be updated as work proceeds based on information supplied to the Contractor. The project schedule shall be drawn in a level of detail suitable for display of all features of the work of each sub-contractor. The schedule shall include the placing of orders for materials, submission of shop drawings for approval, approval of shop drawings, delivery of material, and all work activities to be performed by each sub-contractor. Each sub-contractor shall cooperate to aid in the maintenance and updating of the project schedule. The contractor shall provide the Owner's Representative with all proposed sequences of operation, time estimates to complete operations and other data required for the development, updating and maintenance of the project schedule until completion of the project.

The Contractor and each sub-contractor shall so prosecute their work that they maintain their progress in accordance with the project schedule so that no delays are caused to other sub-contractors engaged in the work. Should any sub-contractor fail to maintain progress according to the schedule or cause delay to another sub-contractor, they shall furnish such additional manpower, equipment, additional shifts or other measures that the Owner's Representative directs to bring his operations up to schedule without any additional cost or expense to the Owner.

The Contractor expressly acknowledges that it is the duty of the Owner's Representative when directed by the Owner, to monitor progress on the project and report at job meetings so that adjustments may be made in the project schedule, including changes in construction logic, which will expeditiously progress the project.

The Owner reserves the right to incorporate into the approved project schedule, the work of additional contractors and services that may be engaged on the project.

The Owner shall have the authority to order the Contractor to speed up his rate of progress if the rate of progress is not satisfactory as determined by the approved project schedule.

### **1.05 SITE USE RESTRICTIONS**

The Contractor shall schedule all operations to minimize interference with existing pedestrian and vehicular traffic and existing utilities.

The Contractor shall contain all construction activities within the project area. Damage to areas outside the project area shall be repaired to the original condition, by the Contractor, at the Contractor's expense.

The Contractor shall notify the Owner's Representative and appropriate utility companies at least 48 hours in advance of any proposed interruptions to existing utility services.

The Contractors shall provide and maintain as neat and clean a construction site as possible.

No diesel fuel or other toxic materials are to be stored on site.

Comply with all conditions of applicable permits with respect to allowed periods of construction.

### **1.06 GENERAL QUALITY CONTROL**

- A. The Contractor shall visit the site where the work of the contract is to be performed. The Contractor shall examine and inform themselves of all existing conditions related to the performance of the contract.
- B. The work of this contract shall be performed only with personnel possessing the required skills for each portion of the work. Any work not meeting Owner's Representative's standards for adequate workmanship must be removed and replaced. All work shall be performed in accordance with the applicable standards, requirements and specifications.
- C. The Contractor shall take full responsibility for failure of materials, devices, equipment, systems, and finishes erected or applied in accordance with the requirements of this article and shall remove, replace, repair or correct any such failures or deficiencies promptly, upon notification by Owner or Owner's Representative.
- D. Whenever any manufacturer of material utilized in the project issues recommended fabrication, installation, erection and/or application standards or instructions, such standards or instructions shall be strictly followed in the performance of the work, except as specified or approved otherwise in writing.
- E. Whenever any trade, organization, institution, utility company, code group, society, association and/or governing board standard, requirement or specification is adopted by the reference in these specifications, perform all work related thereto in strict accordance with the latest edition thereof and/or amendments thereto or the specifications herewith, whichever is more stringent.

### **1.07 SECURITY AND PROTECTION**

- A. The Contractor is responsible for the security and protection of his equipment, materials and work on the project. The Contractor may, at their option, provide temporary lighting or fencing. All installations must be approved by the Owner's Representative. The Contractor is responsible for providing adequate barricades, warning signs and lights to prevent accidents and losses. Provide lights, painted barricades and signs to inform the general public of hazards.

- B. The Contractor shall provide an acceptable and safe pedestrian route for those who must circumvent the project site.

#### **1.08 EXISTING UTILITIES AND SERVICES**

- A. The existence and location of utilities shown on the plans are not guaranteed and shall be investigated and verified by the Contractor before starting work. Excavation in the vicinity of existing utilities and structures shall be carefully performed. The Contractor shall take all necessary steps to safeguard and keep from damage any and all existing structures and utilities.
- B. Should a utility line, which is to remain, be damaged during the process of the work, the Contractor shall promptly notify the Owner's Representative. The Contractor shall be held responsible for any damage to utility lines during the process of the work.
- C. Provide for, and maintain in operation, all existing services intended to remain, and restore all such services if damaged, at the expense of the Contractor.

#### **1.09 DISPOSAL OF MATERIALS**

- A. All excess materials, debris, clearing and demolition items shall be removed from the site and disposed of in a safe and legal manner by the Contractor unless otherwise approved in writing by the Owner's Representative.

#### **1.10 MATERIAL STORAGE**

- A. The Contractor assumes full responsibility for the protection and safekeeping of their materials and equipment at the project premises. Stored materials and equipment shall be secured by the Contractor in such a manner as to deny entry or access by persons other than the Contractor. Combustible materials, especially flammable products and liquids such as diesel fuel and gasoline, shall not be stored on site. The Contractor shall keep the work and storage areas clean and free of debris.

#### **1.11 NOISE**

- A. The Contractor shall comply with any noise ordinance regulations as promulgated by the Town of Schuylerville or other affected regulatory bodies. The Contractor shall eliminate noise to as great an extent as possible at all times. Air compressors shall be equipped with silencers, and the exhaust of all gasoline motors and other power equipment shall be provided with mufflers.

#### **PART 2 PRODUCTS**

Not Used.

#### **PART 3 EXECUTION**

Not Used.

**END OF SECTION**



## **SECTION 01 2000**

### **PRICE AND PAYMENT PROCEDURES**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Contingency allowance.
- B. Schedule of values.
- C. Applications for payment.
- D. Change procedures.
- E. Defect assessment.

##### **1.2 CONTINGENCY ALLOWANCE**

- A. Include in the Contract, one field contingency allowance, a stipulated sum/price of \$30,000 for a general contingency allowance to be used upon Owner's instruction.
- B. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.
- C. Funds will be drawn from Contingency Allowance only by Change Order.
- D. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

##### **1.3 SCHEDULE OF VALUES**

- A. Submit printed schedule on AIA Form G703 - Continuation Sheet for G702.
- B. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- C. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section. Identify site mobilization, bonds and insurance.
- D. Include in each line item, amount of Allowances specified in this section.
- E. Include separately from each line item, direct proportional amount of Contractor's overhead and profit.
- F. Revise schedule to list approved Change Orders, with each Application for Payment.

#### **1.4 APPLICATIONS FOR PAYMENT**

- A. Submit three copies of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702. Include two (2) copies of Contractors and Subcontractors certified payroll.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Submit updated construction schedule with each Application for Payment.
- D. Payment Period: Submit at intervals stipulated in the Agreement.
- E. Submit with transmittal letter as specified for Submittals in Section 01 3300.
- F. Submit certified payrolls with each payment application.
- G. Contractor shall receive payment approximately 4 weeks from the time the payment application is submitted to Town of Saratoga - On behalf of Historic Hudson & Hoosic Rivers Partnership.

#### **1.5 CHANGE PROCEDURES**

- A. Submittals: Submit name of individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.
- B. The Owner's Representative will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on AIA Form G710.
- C. The Owner's Representative may issue a Proposal Request including a detailed description of proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with stipulation of overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within 15 days.
- D. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation.
- E. Construction Change Directive: Owner's Representative may issue directive, on AIA Form G713 Construction Change Directive signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.

#### **1.6 DEFECT ASSESSMENT**

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of the Owner's Representative, it is not practical to remove and replace the Work, the Owner's Representative will direct appropriate remedy or adjust payment.

- C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Owner's Representative.
- D. Defective Work will be partially repaired to instructions of Owner's Representative and unit sum/price will be adjusted to new sum/price at discretion of Owner's Representative.
- E. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.
- F. Authority of Owner's Representative to assess defects and identify payment adjustments, is final.
- G. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:
  - 1. Products wasted or disposed of in a manner that is not acceptable.
  - 2. Products determined as unacceptable before or after placement.
  - 3. Products not completely unloaded from transporting vehicle.
  - 4. Products placed beyond lines and levels of required Work.
  - 5. Products remaining on hand after completion of the Work.
  - 6. Loading, hauling, and disposing of rejected products.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

## **SECTION 01 3000**

### **ADMINISTRATIVE REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Coordination and project conditions.
- B. Field engineering.
- C. Preconstruction meeting.
- D. Progress meetings.

##### **1.2 COORDINATION AND PROJECT CONDITIONS**

- A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.

##### **1.3 FIELD ENGINEERING**

- A. Employ Land Surveyor registered in State of New York and acceptable to Architect/Engineer.
- B. Locate and protect survey control and reference points. Promptly notify Owner's Representative of discrepancies discovered.
- C. Control datum for survey is that established by Owner provided survey.
- D. Verify set-backs and easements; confirm drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- F. Submit copy of site drawing and certificate signed by Land Surveyor certifying elevations and locations of the Work are in conformance with Contract Documents.
- G. Maintain complete and accurate log of control and survey work as Work progresses.
- H. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- I. Promptly report to Owner's Representative loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- J. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Owner's Representative.

##### **1.4 PRECONSTRUCTION MEETING**

- A. Owner's Representative will schedule meeting after Notice of Award.

- B. Attendance Required: Owner, Owner's Representative and Contractor, at a minimum.
- C. Agenda:
  - 1. Execution of Owner-Contractor Agreement.
  - 2. Submission of executed bonds and insurance certificates.
  - 3. Distribution of Contract Documents.
  - 4. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
  - 5. Designation of personnel representing parties in Contract, and Owner's Representative.
  - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  - 7. Scheduling.
- D. Contractor to record minutes and distribute copies within two days after meeting to participants and those affected by decisions made.

## **1.5 PROGRESS MEETINGS**

- A. Schedule and administer meetings throughout progress of the Work at intervals deemed appropriate to the progress of work.
- B. Contractor to make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner, Owner's Representative, as appropriate to agenda topics for each meeting.
- D. Agenda:
  - 1. Review minutes of previous meetings.
  - 2. Review of Work progress.
  - 3. Field observations, problems, and decisions.
  - 4. Identification of problems impeding planned progress.
  - 5. Review of submittals schedule and status of submittals.
  - 6. Review of off-site fabrication and delivery schedules.
  - 7. Maintenance of progress schedule.
  - 8. Corrective measures to regain projected schedules.
  - 9. Planned progress during succeeding work period.
  - 10. Coordination of projected progress.
  - 11. Maintenance of quality and work standards.
  - 12. Effect of proposed changes on progress schedule and coordination.
  - 13. Other business relating to Work.
- E. Contractor to record minutes and distribute copies within two days after meeting to participants, and those affected by decisions made.

## **PART 2 PRODUCTS**

Not Used.

### **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

**SECTION 01 3300**  
**SUBMITTAL PROCEDURES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Product data.
- D. Shop drawings.
- E. Samples.
- F. Test reports.
- G. Certificates.
- H. Manufacturer's instructions.

**1.2 SUBMITTAL PROCEDURES**

- A. The Contractor shall provide a submittal schedule to the Owner's Representative at the start of the Project, for approval. Schedule submittals to expedite the project based on the dates materials are required on site, taking into account fabrication or manufacturing time. Coordinate the submission of related items. Deliver all submittals to Owner's Representative.
- B. Transmit each submittal with AIA Form G810 or Owner's Representative accepted form.
- C. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
- D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.
- E. Identify Project, Contractor, subcontractor and supplier, pertinent drawing, detail number and specification section.
- F. Allow 10 working days for the review of each shop drawing and five working days for review of all other submittals, excluding delivery time to and from the Contractor.
- G. Allow space on submittals for Contractor and Owner's Representative review stamps.
- H. When revised for resubmission, identify changes made since previous submission.
- I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- J. Submittals not requested will not be recognized or processed.

### **1.3 CONSTRUCTION PROGRESS SCHEDULES**

- A. Submit initial construction schedule within 7 days after receipt of notice to proceed. After review, resubmit required revised data within ten days.
- B. Submit computer generated horizontal bar chart with separate line for each major portion within each division of Work, identifying the first work day of each week, for the initial schedule.
- C. Submit revised Progress Schedules periodically.
- D. Promptly report, in writing to the Owner's Representative and Owner, problems anticipated in meeting projected schedules.
- E. Submit a separate schedule of submittal dates for shop drawings, product data, and samples. Indicate the key dates when reviewed submittals for long lead items will be required from the Owner's Representative, and indicate latest decision dates for the selection of finishes.
- F. Revisions To Schedules:
  - 1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
  - 2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

### **1.4 PRODUCT DATA**

- A. Product Data: Submit for review to the Owner's Representative for the limited purpose of checking for conformance with the information given and the design concept expressed in the Contract Documents.
- B. Submit three (3) copies.
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics and utility connection requirements.

### **1.5 SHOP DRAWINGS**

- A. Shop Drawings: Submit for review to the Owner's Representative for the limited purpose of checking for conformance with the information given and the design concept expressed in the Contract Documents.
- B. Submit four (4) copies.
- C. Indicate special utility and electrical characteristics, utility connection requirements, and, where appropriate, the location of utility outlets for service for equipment and appliances.

### **1.6 SAMPLES**

- A. Samples: Submit for review to the Owner's Representative for the limited purpose of checking for conformance with the information given and the design concept expressed in the Contract Documents.
- B. Submit three (3) of each sample.



- C. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- D. Include identification on each sample, with full Project information.
- E. Reviewed samples may be used in the Work only when indicated in specification sections.
- F. Samples will not be used for testing purposes unless specifically stated in specification sections.

#### **1.7 TEST REPORTS**

- A. Submit for Owner's Representative knowledge as contract administrator or for Owner.
- B. Submit test reports for the limited purpose of assessing conformance with the information given and the design concept expressed in Contract Documents.

#### **1.8 CERTIFICATES**

- A. When specified in individual specification sections, submit certification by the manufacturer, the installation/application subcontractor, or the Contractor to the Owner's Representative, in quantities specified for Product Data.
- B. Indicate if material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on a material or Product, but must be acceptable to the Owner's Representative.

#### **1.9 MANUFACTURER'S INSTRUCTIONS**

- A. When specified in individual specification sections, submit printed instructions for the delivery, storage, assembly, installation, start-up, adjusting, and finishing of a device or product, to the Owner's Representative for delivery to Owner in quantities specified.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

### **PART 2 PRODUCTS**

Not Used.

### **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

**SECTION 01 4000**  
**QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Quality control and control of installation.
- B. Tolerances
- C. References.
- D. Testing and inspection services.
- E. Manufacturers' field services.

**1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION**

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

**1.3 TOLERANCES**

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

## **1.4 REFERENCES**

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from Owner's Representative before proceeding.
- E. Neither contractual relationships, duties, nor responsibilities of the parties in Contract, nor those of the Owner's Representative, shall be altered from that which is stated in the Contract Documents by mention or inference in reference documents.

## **1.5 TESTING AND INSPECTION SERVICES**

- A. At the Owner's discretion, the Owner may employ and pay for the specified services of an independent firm to perform testing and inspection in addition to those independent testing and inspection services specified to be provided by the Contractor.
- B. When a testing laboratory is retained by the Contractor, submit, prior to the start of Work, the testing laboratory name, address, and telephone number, and names of full time specialist and responsible officer. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of deficiencies reported by inspection.
- C. An independent firm will perform tests, inspections and other services specified in individual specification sections and as required by the Owner's Representative.
  - 1. Laboratory: Authorized to operate in State of New York.
  - 2. Laboratory Staff: Maintain full time specialist on staff to review services.
  - 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- D. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by the Owner's Representative or Owner.
- E. Reports shall be submitted by an independent testing firm to the Owner's Representative and Contractor, in duplicate, and will provide observations and test results that indicate compliance or non-compliance with the Contract Documents.
- F. Cooperate with the independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
  - 1. Notify Owner's Representative and independent firm 24 hours prior to expected time for operations requiring services.
  - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- G. Testing and the employment of a testing agency or laboratory shall not relieve the Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

- H. Re-testing or re-inspection required because of non-conformance with specified requirements shall be performed by the same independent firm that performed the initial test, at the discretion of the Owner's Representative. Payment for re-testing or re-inspection shall be the responsibility of the Contractor.
- I. Testing Agency Responsibilities:
  - 1. Test samples of mixes submitted by Contractor.
  - 2. Provide qualified personnel at site. Cooperate with Owner's Representative and Contractor in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified standards.
  - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify Owner's Representative and Contractor of observed irregularities or non-conformance of Work or products.
  - 6. Perform additional tests required by Owner's Representative.
  - 7. Attend pre-construction meetings and progress meetings.
- J. Testing Agency Reports: After each test, promptly submit two copies of report to Owner's Representative and to Contractor. When requested by Owner's Representative, provide interpretation of test results. Include the following:
  - 1. Date issued.
  - 2. Project title and number.
  - 3. Name of inspector.
  - 4. Date and time of sampling or inspection.
  - 5. Identification of product and specifications section.
  - 6. Location in Project.
  - 7. Type of inspection or test.
  - 8. Date of test.
  - 9. Results of tests.
  - 10. Conformance with Contract Documents.
- K. Limits On Testing Authority:
  - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency or laboratory may not assume duties of Contractor.
  - 3. Agency or laboratory has no authority to stop the Work.

## **1.6 MANUFACTURERS' FIELD SERVICES**

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Owner's Representative 30 days in advance of required observations. Observer subject to approval of Owner's Representative.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 01 3300 - SUBMITTAL PROCEDURES

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

**SECTION 01 4533**  
**SPECIAL INSPECTIONS AND STRUCTURAL TESTING**

**PART 1 - GENERAL**

**1.1 GENERAL REQUIREMENTS**

- A. Special Inspections and Structural Testing shall be in accordance with Chapter 17 of the *Building Code of New York State* (BCNYS).

**1.2 DEFINITIONS**

- A. Registered Design Professional: Licensed Professional Engineer or Registered Architect whose seal appears in the Construction Drawings. Unless noted otherwise, references to the Registered Design Professional in this section refer to the Structural Engineer for building design.
- B. RDP for Geotechnical Engineering: Licensed Professional Engineer whose seal appears on the Geotechnical Investigation. The RDP for Geotechnical Engineering shall perform or oversee Agent 2 services as indicated in the Schedule of Special Inspections. If a Geotechnical Investigation was not performed or if the RDP for Geotechnical Engineering is not retained to perform Agent 2 services, a licensed Geotechnical Engineer shall be retained to perform these duties.
- C. Code Enforcement Official: Officer or other designated authority charged with administration and enforcement of the BCNYS. For projects under jurisdiction of New York State agencies such as the Department of Education (SED), State University Construction Fund (SUCF), Office of General Services (OGS), and Dormitory Authority (DASNY), the Code Enforcement Official is an official from agency having jurisdiction.
- D. Special Inspector (SI): Professional Engineer licensed in the State of New York [or other state], acting on behalf of the Owner, that implements the Special Inspection Program for the project.
- E. Testing/Inspecting Agency: Agent retained by Special Inspector or Owner and coordinated by Special Inspector to perform some inspection services on behalf of Special Inspector.
- F. Testing/Inspecting Agency (Agent 1): Professional Engineer licensed in the State of New York that is qualified to perform structural inspections. The Special Inspector shall have a minimum of three years of experience performing inspections for similar projects.
- G. Testing/Inspecting Agency (Agent 2): Professional Geotechnical Engineer licensed in the state of New York, that is qualified to perform inspections for preparation of building subgrades and foundations.

- H. Testing/Inspecting Agency (Agents 3 or 4): Agency or firm qualified to inspect certain structural elements and perform field and laboratory tests to determine the characteristics and quality of building materials and workmanship.
- I. Statement of Special Inspections: Documents prepared by the Registered Design Professional and filed with and approved by the Code Enforcement Official as a condition of obtaining a building permit. These documents include this specification and the Schedule of Special Inspections.
- J. Schedule of Special Inspections: An itemized list of inspections, verifications, and tests (including frequency) required for the project and individuals, agencies, or firms who will be retained to perform these services. The Schedule of Special Inspections is located in Drawing S-003.
- K. Seismic/Wind-Force-Resisting System: Components of the structural system that provide resistance to seismic/wind forces. These components are identified in the Schedule of Special Inspections.
- L. Inspect and Inspection: Visual observation of materials, equipment, or construction work as defined in the Statement of Special Inspections, to determine that the work is in substantial conformance with the requirements of the Contract Documents.
- M. Continuous Special Inspection: Full-time observation of work by the Special Inspector or Testing Agency while the work is being performed.
- N. Periodic Special Inspections: Part-time or intermittent observation of work by the Special Inspector or Testing Agency for work that has been or is being performed and at completion of work.

### 1.3 QUALIFICATIONS

- A. Special Inspector and Testing/Inspecting Agency shall be accepted by the Registered Design Professional (RDP) and the Code Enforcement Official.
- B. Special Inspections shall be performed by agents who have relevant experience for each category of inspections indicated in the drawings.
- C. Minimum qualifications of inspection agents are indicated in the drawings.

### 1.4 SUBMITTALS

- A. Special Inspector and Testing/Inspecting Agency shall submit to the Registered Design Professional and Code Enforcement Official for review, a copy of their qualifications including names and qualifications of each inspector and technician who will be performing inspections or tests.
- B. Special Inspector and Testing/Inspecting Agency shall disclose past or current business relationship or potential conflict of interest with Contractor or Subcontractors whose work will be inspected or tested.

## 1.5 PAYMENT

- A. Owner will engage and pay for services of Special Inspector and Testing/Inspecting Agency.
- B. If materials requiring Special Inspections are fabricated in a plant not within 200 miles of project site, Contractor shall be responsible for travel expenses of Special Inspector or Testing/Inspecting Agency.
- C. Contractor shall be responsible for cost of retesting or reinspection of work failing to comply with requirements of Contract Documents.

## 1.6 OWNER RESPONSIBILITIES

- A. Owner will provide Special Inspector with complete set of Contract Documents sealed by the Registered Design Professional and approved by the Code Enforcement Official.

## 1.7 CONTRACTOR RESPONSIBILITIES

- A. Contractor shall cooperate with Special Inspector and his agents so Special Inspections and testing may be performed without hindrance.
- B. As indicated in the Schedule of Special Inspections, Contractor shall notify Special Inspector or Testing/Inspecting Agency at least 48 hours in advance of a required inspection or test.
- C. Contractor shall provide incidental labor and facilities to provide access to work to be inspected or tested, to obtain and handle samples at site or at source of products to be tested, to facilitate tests and inspections, and for storing and curing of test samples.
- D. If Special Inspections or testing require the use of Contractor's scaffolding to access work areas, Contractor shall provide competent person to perform daily evaluation of scaffolding to verify it is safe to use. Contractor shall notify Special Inspector and Testing Agent of this review before each use. Contractor is responsible for safe assembly and stability of scaffolding.
- E. Contractor shall keep latest set of Construction Drawings, field sketches, accepted shop drawings, and specifications at project site for field use by Inspectors and Testing Technicians.
- F. Contractor shall perform remedial work if required and sign nonconformance reports stating remedial work has been completed. Contractor shall submit signed reports to Special Inspector as work proceeds.
- G. The Special Inspection program shall not relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents or from implementing an effective Quality Control program.



H. Contractor shall be solely responsible for construction site safety.

## 1.8 SPECIAL INSPECTOR RESPONSIBILITIES

- A. Special Inspector shall hold a Special Inspections preconstruction meeting at least 7 days prior to initial planned date for start of construction. Attendees shall include Contractors, Owner's Representative, Testing Agency, Special Inspector, and Registered Design Professionals for Structural Engineering and for Architecture. Discussions shall include the following:
  - 1. Review of specifications and Schedule of Special Inspections for work requiring Special Inspections.
  - 2. Responsibilities of Contractors, Owner, Testing Agency, Special Inspector, and Registered Design Professional.
  - 3. Notification and reporting procedures.
- B. Special Inspector shall record and distribute minutes from the Special Inspection Preconstruction meeting.
- C. Special Inspector shall review inspection and material testing reports and coordinate the services of the Testing/Inspecting Agencies as follows:
  - 1. Verify inspections have been performed in accordance with the Schedule of Special Inspections.
  - 2. Verify reports are being distributed to the Contractor, Owner, Architect, Code Enforcement Official, and Registered Design Professional (RDP) for Structural Engineering.
  - 3. Verify discrepancies have been recorded and are being tracked.
- D. Special Inspector shall make site visits to inspect work as designated in the Statement of Special Inspections. Discrepancies will be brought to the attention of the Contractor and RDP.
- E. Special Inspector shall keep records of inspections.
- F. Special Inspector shall review Certificates of Compliance for conformance with the standards specified in the Contract Documents. Discrepancies will be brought to the attention of the Contractor and RDP.
- G. Special Inspector shall submit a final report of Special Inspections in accordance with Section 1.3 of this specification.

## 1.9 LIMITS ON AUTHORITY

- A. Special Inspector or Testing/Inspecting Agency shall not release, revoke, alter, or enlarge on requirements of Contract Documents.

- B. Special Inspector or Testing/Inspecting Agency shall not have control over Contractor's means and methods of construction.
- C. Special Inspector or Testing/Inspecting Agency shall not be responsible for construction site safety.
- D. Special Inspector or Testing/Inspecting Agency shall not have authority to stop work.

## **PART 2 - INSPECTIONS AND TESTING**

### **2.1 EXCAVATION, BACKFILL, COMPACTION, AND DEEP FOUNDATIONS (BUILDING AREA)**

- A. Special Inspector shall perform inspections and verifications or coordinate the RDP for Geotechnical Engineering to perform inspections and verifications including the following:
  - 1. Identify soils requiring undercutting and replacing while observing proof rolling and when subgrade is exposed.
  - 2. Verify footing bearing strata.
  - 3. Review and accept materials proposed by Contractor for use as compacted fill based on test data and information submitted by Testing Agency. Material approval shall be based on requirements and recommendations stated in Project Geotechnical and Subsurface Investigation.
  - 4. Observe and accept filling and compaction procedures.
  - 5. Observe and accept preparation of slab-on-grade subgrade and subbase.
- B. Testing Agency shall perform field density tests for building subgrades and for fill materials including slab subbase within building area in accordance with ASTM D 6938 as follows:
  - 1. Footing subgrade and each stratum of soil on which footings will be placed.
  - 2. Building subgrade including slab subbase and each lift of compacted material.
  - 3. Inspect each subgrade and fill layer before further backfill or construction work is performed. Approval shall be based on satisfactory achievement of compaction criteria.
  - 4. Verify use of fill material and lift thicknesses in field.
- C. Testing Agency shall perform moisture content testing of slab subbase in accordance with ASTM D 6938.
- D. Pile Foundations:
  - 1. Special Inspector shall perform inspections and verifications or coordinate the RDP for Geotechnical Engineering to perform inspections and verifications including the following:
    - a. Verify pile materials, sizes, and condition prior to installation.
    - b. Review pile location plan provided by Contractor.
    - c. Observe test pile installation and load testing.

- d. Review records of load test results provided by Contractor.
  - e. Observe pile installation and maintain installation records in accordance with 1.31B.
  - f. Inspect pile reinforcement.
  - g. Verify acceptable bearing strata and depths have been reached during installation.
2. Testing Agency shall perform the following:
- a. Visually inspect pile splice welds in accordance with AWS for steel piles and casings. Inspect welds for driving shoes.
  - b. For cast-in-place piles including concrete-filled pipe piles, sample fresh concrete and perform compressive strength testing in accordance with Cast-In-Place Concrete section of this section.
  - c. For grouted micropiles perform the following:
    - I. Prepare compressive test specimens (cubes) in accordance with ASTM C 109. Store undisturbed in insulated box during cold weather. Deliver to laboratory between 16 and 32 hours after making. Perform compressive tests in accordance with ASTM C 109: two specimens tested at 7 days, two specimens tested at 28 days, and two specimens retained for later testing if required.
    - II. In cold weather or whenever the piles will be loaded less than 14 days after grouting, cast additional set of four cubes for each pile. Field-cure cubes and test two specimens at 7 days, retaining two specimens for later testing if required. Piles may not be loaded until grout obtains 75 percent of its design strength.
    - III. Determine grout consistency as measured by grout density in accordance with ASTM C 188 or API RP-13B-1.

## 2.2 CAST-IN-PLACE CONCRETE

### A. Special Inspector shall perform the following:

- 1. Inspect reinforcing steel and placement.
- 2. Inspect embedded bolts and anchor rods prior to concrete placement.

### B. Testing Agency shall perform the following:

- 1. Verify use of required design mix.
- 2. Sample and test concrete during placement as follows. Test shall be taken at point of discharge into structure:
  - a. Record specific locations where concrete was placed. Refer to column lines where possible.
  - b. For each truck, record time concrete is batched as shown in truck ticket, time placement begins/sample time, and time truck is emptied.
  - c. For each truck, sample fresh concrete in accordance with ASTM C 172, except modified for slump to comply with ASTM C 94.
  - d. For each truck, perform slump test in accordance with ASTM C 143. Perform two slump tests for pumped concrete; one at truck and one at point of discharge.

- e. For each truck for self-consolidating concrete, measure slump flow and record visibility stability index in accordance with ASTM C 1611/C 1611M. Slump cone may be in the upright or inverted position. Use same cone position for the entire project for consistency.
  - f. For normal-weight concrete, measure air content in accordance with ASTM C 231, pressure method. For lightweight concrete, measure air content in accordance with ASTM C 173, volumetric method. Perform one test for each truck for air-entrained and non-air-entrained concrete.
  - g. Record temperature of concrete for each truck. Test in-place concrete temperature hourly when ambient temperature is 40 degrees F and below and when 80 degrees F and above.
  - h. Record air temperature and general weather conditions (cloudy, windy, sunny, etc.).
  - i. Record unit weight of fresh normal-weight concrete in accordance with ASTM C 138. Record unit weight of lightweight concrete in accordance with ASTM C 567. Perform one test for each 50 cubic yard of concrete.
  - j. Perform concrete compressive tests as follows:
    - I. Prepare compressive test specimens in accordance with ASTM C 31. Take a set of six 6 x 12 cylinders or nine 4 x 8 cylinders for each 50 cubic yards of concrete or each 5,000 square feet of slab area for each type of concrete. Store undisturbed in insulated box during cold weather. Deliver to laboratory between 16 and 32 hours after making. Perform compressive tests in accordance with ASTM C 39: two 6 x 12 specimens (three 4 x 8 specimens) tested at 7 days, two 6 x 12 specimens (three 4 x 8 specimens) tested at 28 days, and two 6 x 12 specimens (three 4 x 8 specimens) retained for later testing if required.
    - II. In cold weather or whenever steel erection is scheduled to commence less than 14 days after placement of supporting foundation concrete, cast additional set of four 6 x 12 specimens (six 4 x 8 specimens) for each 50 cubic yards or fraction thereof of supporting foundation concrete. Field-cure cylinders, and test two 6 x 12 specimens (three 4 x 8 specimens) at 7 days, retaining two 6 x 12 specimens (three 4 x 8 specimens) for later testing if required. Steel erection may not begin until supporting concrete obtains 75 percent of its design strength.
    - III. If concrete will be placed in separate buildings on a given project, make individual compressive strength test cylinders for each building.
  - k. Perform additional testing as follows if required:
    - I. Take additional set of cylinders for compressive strength testing for each truck in which total time period between batching and completing placement has exceeded ACI-recommended, 90-minute-maximum time limit. Take additional cylinders within 10 minutes of placement completion.
    - II. Make additional tests of in-place concrete when test results indicate specified concrete strengths or other characteristics have not been attained in structure.
    - III. Perform tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods acceptable to Architect.
    - IV. Contractor shall reimburse Owner for cost of additional tests.
3. Inspect concrete and shotcrete placement for proper application techniques.

4. Inspect for maintenance of specified curing temperature and techniques.
5. Perform floor flatness ( $F_F$ ) and levelness ( $F_L$ ) testing of slabs receiving a trowel finish no later than 48 hours after slab placement in accordance with ASTM E 1155.
  - a. Each floor/level shall be divided into test section areas.  $F_F$  and  $F_L$  numbers for each test section area are local values.
  - b. Test section areas shall be minimum of 320 square feet with minimum boundary length of 8 feet for any side. Testing is not to be performed for smaller slab areas.
  - c. Test section areas shall be maximum of 2,000 square feet.
  - d. Test section areas shall not cross slab construction joints.
  - e. Locate test lines orthogonally or at 45 degrees to slab edges in accordance with ASTM E 1155 and no closer than 2 feet to any edge or opening.
  - f. Overall  $F_F$  and  $F_L$  numbers are for entire floor/level and shall be determined by considering measurements from all of test section areas on that floor/level.
  - g. ( $F_L$ ) testing is not required for slabs on metal deck.

## 2.3 WOOD FRAMING

A. Special Inspector shall perform the following inspections:

1. Verify material grading, size, and condition of installed framing members for damage.
2. Verify grade, size, and finish of fasteners.
3. Visually inspect installation of metal-framing connectors.
4. Visually inspect installed framing details.
5. Inspect shear wall construction and hold-down anchors.
6. Inspect diaphragm construction, including framing and fasteners at panel edges and boundary elements.
7. Inspect temporary and permanent truss bracing.

B. Testing Agent shall perform the following:

1. Perform pull-out tests on adhesive, expansion, and sleeve anchors.

## PART 3 - DOCUMENTATION

### 3.1 RECORDS AND REPORTS

A. Prepare detailed reports of each test or inspection. Include the following general information:

1. Project name and number.
2. Date of test or inspection.
3. Name of Testing Agency or Inspecting Agency.
4. Name of technician or inspector.
5. Weather conditions.
6. Locations and elevations of specific areas tested or inspected referenced to grid lines.

7. Description of test or inspection.
8. Reference to applicable ASTM standard.
9. Summary of observations, results, and recommendations.
10. Description of areas or materials requiring retesting or reinspection.

B. Reports for each drilled pile or pier shall contain the following information:

1. Elevation of bottom and top.
2. Centerline location at top.
3. Variation of shaft from plumb.
4. Elevation of top and bottom of casings left in place.
5. Volume of grout or concrete in each pile or pier.
6. Condition of bearing strata and verification of review by RDP for Geotechnical Engineering.
7. Water seepage.
8. Unusual conditions.
9. Delays in placement of grout or concrete, and location of construction joints in shafts.
10. Dates of starting excavation or drilling, completion of excavation or drilling, inspections, and placement of concrete.
11. Number of blows for every foot penetration and rate of penetration under last five blows of hammer.
12. Kind and size of hammer used in driving.

C. Concrete compressive strength test reports shall contain the following information:

1. Name of Contractor and concrete supplier.
2. Name of concrete testing service.
3. Name of technician making and testing specimens.
4. Truck number and delivery ticket number.
5. Date and location within structure of concrete placement.
6. Concrete type, class, mix proportions of materials, and design compressive strength at 28 days.
7. Slump, air content, unit weight, and concrete temperature.
8. Total time period between batching and completing placement for each truck.
9. Compressive strength and type of break for tests.

D. Field reports for concrete inspection shall contain general information noted above plus ambient temperature and cylinder numbers.

E. Test reports for masonry materials shall include proportions, composition, and compressive strength.

### 3.2 COMMUNICATION

A. Testing/Inspecting Agency shall immediately notify Contractor, Special Inspector, and Registered Design Professional by telephone, fax, or e-mail of test results failing to comply with requirements of Contract Documents.

- B. Special Inspector shall immediately notify Contractor of work found to be in nonconformance with Contract Documents during inspections. If nonconforming work is not corrected while Special Inspector is on-site, Special Inspector shall notify Registered Design Professional within 24 hours (one business day) and issue an inspection report noting the non-conformance.
- C. Special Inspector and each Testing/Inspecting Agent shall use a log to record and track non-conforming work during construction. Non-Conformance log shall include the following information:
  - 1. Description of non-conformance.
  - 2. Date of non-conformance.
  - 3. Description of RDP response if received.
  - 4. Status of nonconformance: 'Open' or 'Closed.'

Updated log shall be attached to each inspection report. Special Inspector or Testing/Inspecting Agent may use Non-Conformance Log form provided at end of this section or other similar form.

- D. If non-conforming work is not corrected at time of substantial completion of structure or other appropriate time, Special Inspector shall notify Code Enforcement Official.

### 3.3 DISTRIBUTION OF REPORTS

- A. Testing/Inspecting Agency shall submit reports to Special Inspector and Registered Design Professional within 7 days of inspection or test. Legible handwritten reports may be submitted if final typed copies are not available.
- B. Special Inspector shall distribute reports to the Contractor, Owner, Architect, Code Enforcement Official, and RDP for Structural Engineering within 7 days of inspections. Legible handwritten reports may be submitted if final typed copies are not available.
- C. If requested by the Code Enforcement Official, Special Inspector shall submit interim reports that include inspections and tests performed since beginning of construction or since previous interim report. Interim reports shall be addressed to the Code Enforcement Official with copies sent to the Registered Design Professionals (Structural Engineer and Architect) and Contractor. Interim reports shall be signed by Agent performing inspections.

### 3.4 FINAL REPORT OF SPECIAL INSPECTIONS

- A. At completion of work, each Testing/Inspecting Agency shall submit Agent's Final Report of Special Inspections to Special Inspector stating work was completed in substantial conformance with Contract Documents and appropriate inspections and tests were performed. Testing/Inspecting Agency may use Agent's Final Report of Special Inspections form provided at end of this section or other similar form.

- B. At completion of work, Special Inspector shall compile a Final Report of Special Inspections including each Agent's Final Report of Special Inspections. The Final Report of Special Inspections shall state required inspections have been performed and itemize nonconforming work not corrected or resolved as required by the BCNYS. Interim reports from all Agents will not be included unless specifically requested by the Owner or Code Enforcement Official. The Final Report shall be stamped by a New York State Professional Engineer.
- C. Special Inspector may use Final Report of Special Inspections form provided at end of this section or other similar form based on CASE Form 102-2001.
- D. Special Inspector shall submit Final Report of Special Inspections to Registered Design Professional and Code Enforcement Official prior to issuance of a Certificate of Use and Occupancy.



# AGENT X NON-CONFORMANCE LOG

PROJECT:

PROJECT NUMBER:

Non-Conformance Item No. (See Note 1)	Special Inspection Report No. Reference/Date	Summary of Non-Conformance	Date of RDP Response Received	SI Reinspection Required	Date Contractor Verification Received (See Note 1)	Status (See Note 2)
NC 1						
NC 2						
NC 3						
NC 4						
NC 5						
NC 6						

1. New items are in **bold**. For each non-conformance item above, the General Contractor or Subcontractor must sign and submit the Contractor Verification statement located in the RDP Response Report.

2. Non-conformance items remain "OPEN" until the Contractor Verification have been received. When the signed verifications have been received by the RDP, the item will be "CLOSED".

# Testing/Inspection Agent's Final Report of Special Inspections

Project Name: \_\_\_\_\_ Inspection Agent: \_\_\_\_\_  
Location: \_\_\_\_\_ Inspection Agent Project No.: \_\_\_\_\_  
Owner: \_\_\_\_\_ Special Inspector: \_\_\_\_\_  
Owner Address: \_\_\_\_\_ Structural RDP: \_\_\_\_\_  
Ryan Biggs | Clark Davis Project No.: \_\_\_\_\_

To the best of my information, knowledge, and belief, the Special Inspections and testing required for this project and designated for this Agent in the **Statement of Special Inspections** (which includes Specification Section **01 4533** and the Schedule of Special Inspections) have been performed and discovered discrepancies have been reported and resolved except for the following:

Comments:

**[Attach continuation sheets if required to complete description of uncorrected discrepancies.]**

Respectfully submitted,  
Agent of the Special Inspector  
**[TITLE]**

\_\_\_\_\_  
(Type or print name)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Address

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

Design Professional Seal or Certification

# Final Report of Special Inspections

Project Name: \_\_\_\_\_ Special Inspector: \_\_\_\_\_  
Location: \_\_\_\_\_ Special Inspector Project No.: \_\_\_\_\_  
Owner: \_\_\_\_\_ Architect of Record: \_\_\_\_\_  
Owner Address: \_\_\_\_\_ Structural RDP: \_\_\_\_\_  
Ryan Biggs | Clark Davis Project No.: \_\_\_\_\_

To the best of my information, knowledge, and belief, Special Inspections required for this project, as indicated in the **Statement of Special Inspections**, (which includes Specification Section **01 4533** and the Schedule of Special Inspections) have been performed and discovered discrepancies have been reported and resolved except for the following:

Comments:

**[Attach continuation sheets if required to complete description of uncorrected discrepancies.]**

Interim reports submitted prior to this Final Report form a basis for and are to be considered an integral part of this Final Report. Upon request, the interim Testing and Special Inspection reports can be provided. Agent's Final Reports of Special Inspections are attached and are also a part of this Final Report.

Respectfully submitted,  
Special Inspector  
[TITLE]

\_\_\_\_\_  
(Type or print name)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Professional Seal

## **SECTION 01 5000**

### **TEMPORARY FACILITIES AND CONTROLS**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Temporary Utilities: Electricity, telephone service, water, sanitary, first aid and fire extinguisher facilities.
- B. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control.
- C. Construction Facilities: Access roads, parking, progress cleaning, and temporary construction trailer

##### **1.2 RELATED SECTIONS**

- A. Section 01 7000 – Execution Requirements.

##### **1.3 GENERAL**

- A. Use qualified tradespersons for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the Work.
  - 1. Require that tradespersons accomplishing this work be licensed as required by the local authority for whom the work is performed.
  - 2. Relocate, modify and extend services and facilities as required during the course of the work so as to accommodate the entire work of the project.

##### **1.4 TEMPORARY ELECTRICITY**

- A. General: Comply with applicable NEMA, NECA and UL standards and governing regulations for materials and layout of temporary electrical service.
- B. Power Distribution System: Provide circuits of adequate size and proper characteristics for each use.
- C. Ground Fault Protection: Equip all circuits for any purpose entering Work Area with ground fault circuit interrupters (GFCI). Locate GFCI's exterior to Work Area so that all circuits are protected prior to entry to work area. Provide circuit breaker type GFCI equipped with a test button and reset switch for all circuits to be used for any purpose in the Work Area, exterior, or as otherwise required by the National Electrical Code, OSHA or other authority.
- D. Electrical Power Cords: Use only grounded extension cords; use "hard-service" cords where exposed to abrasion or traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach the areas of work.
- E. Lamps and Light Fixtures: Provide general service incandescent lamps or florescent lamps of wattage indicated or required for adequate illumination as required for the work.

- F. Cost: By Contractor; provide and pay for power service required.
- G. Owner's power source is not available. Contractor is to provide their own power sources as necessary.

#### **1.5 TELEPHONE SERVICE**

- A. Provide, maintain, and pay for telephone service at Contractor's field office.

#### **1.6 TEMPORARY WATER SERVICE**

- A. Temporary Water Service Connection: Provide, maintain and pay for suitable quality water service required for construction operations at time of project mobilization. Connect hoses or other fittings only to existing water supplies designated by the Owner. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water will not damage existing finishes or equipment.
- B. Water Hoses: Employ heavy duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water to each work area and to each Decontamination Unit. Provide fittings as required to allow for connection to existing hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment.
- C. Hot Water: Hot water will not be available from the Owner.

#### **1.7 TEMPORARY SANITARY FACILITIES**

- A. Provide and maintain required facilities and enclosures for the duration of the project. Coordinate location of units with college. Clean units weekly or more often as necessary. Provide all toilet supplies as required.

#### **1.8 FIRST AID**

- A. Provide first aid supplies in conformance with governing regulations and recognized recommendations within the construction industry.

#### **1.9 BARRIERS**

- A. Provide barriers to prevent unauthorized entry to construction areas to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

#### **1.10 WATER CONTROL**

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment. Silt fence and or straw bales to be provided as necessary to prevent off-site sediment transport.
- B. Protect site from puddling or running water.

#### **1.11 PROTECTION OF INSTALLED WORK**

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.

#### **1.12 SECURITY**

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

#### **1.13 ACCESS ROADS**

- A. Provide and maintain access to fire hydrants, free of obstructions.
- B. Designated existing roads may be used for construction traffic.

#### **1.14 PARKING**

- A. Coordinate with Owner's Representative for temporary parking areas to accommodate construction personnel.

#### **1.15 PROGRESS CLEANING AND WASTE REMOVAL**

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.

#### **1.16 FIELD OFFICES**

- A. Provide and maintain one weather tight and insulated temporary office of sufficient size to accommodate Contractor's personnel at the Project Site as necessary. Coordinate location of offices with Owner's Representative, note staging area indicated on the plans.

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

- A. Remove temporary utilities, equipment, facilities, materials and prior to Final Application for Payment inspection.
- B. Remove underground installations to a minimum depth of 2 feet.
- C. Clean and repair damage caused by installation or use of temporary work.

### **PART 2 PRODUCTS**

Not Used.

### **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

**SECTION 01 6000**  
**PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.

**1.2 PRODUCTS**

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.

**1.3 PRODUCT DELIVERY REQUIREMENTS**

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

**1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS**

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.
- E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

## **1.5 PRODUCT OPTIONS**

- A. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

## **1.6 PRODUCT SUBSTITUTION PROCEDURES**

- A. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
- B. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- C. A request constitutes a representation that Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
  - 2. Will provide same warranty for Substitution as for specified product.
  - 3. Will coordinate installation and make changes to other Work that may be required as a result of the substitution with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extensions that may subsequently become apparent, as a result of the substitution.
  - 5. Will reimburse Owner for review or redesign services associated with re-approval by authorities having jurisdiction.
- D. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.
- E. Substitution Submittal Procedure:
  - 1. Submit three (3) copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
  - 2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
  - 3. Owner's Representative will notify Contractor in writing of decision to accept or reject request.

**END OF SECTION**



**SECTION 01 7000**  
**EXECUTION REQUIREMENTS**

**PART 1**

**1.1 SECTION INCLUDES**

- A. Closeout procedures.
- B. Final cleaning.
- C. Protecting installed construction.
- D. Project record documents.
- E. Operation and maintenance data.
- F. Product warranties and product bonds.

**1.2 CLOSEOUT PROCEDURES**

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Owner's Representative's review.
- B. Provide submittals to Owner's Representative required by authorities having jurisdiction.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

**1.3 FINAL CLEANING**

- A. Execute final cleaning prior to final project assessment.
- B. Clean surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces,
- C. Clean furnishings and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.
- D. Clean debris from drainage systems.
- E. Clean site; sweep paved areas, rake clean landscaped surfaces.
- F. Remove waste and surplus materials, rubbish, and construction facilities from site.

**1.4 PROTECTING INSTALLED CONSTRUCTION**

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

- C. Provide protective coverings as required.
- D. Prohibit traffic from landscaped areas.

## **1.5 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed Shop Drawings, Product Data, and Samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 2. Field changes of dimension and detail.
  - 3. Details not on original Contract drawings.
- G. Submit documents to Owner's Representative with claim for final Application for Payment. Contractor shall maintain a copy of all record documents for a minimum of three (3) years after final payment has been made.

## **1.6 OPERATION AND MAINTENANCE DATA**

- A. Obtain and provide operation and maintenance instructions for all applicable work.

## **1.7 PRODUCT WARRANTIES AND PRODUCT BONDS**

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals.

- E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.
- F. Submit minimum of 10 days prior to final Application for Payment.
- G. Time Of Submittals:
  - 1. Make submittals within ten (10) days after Date of Substantial Completion, prior to final Application for Payment.
  - 2. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

## **PART 2 PRODUCTS**

Not Used.

## **PART 3 EXECUTION**

Not Used.

**END OF SECTION**

**SECTION 03 3000**  
**CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.
- B. Concrete paving and walks are specified in Division 32.
- C. Section 033020: Concrete Slab on Grade.

**1.2 DESCRIPTION OF WORK**

- A. This section specifies cast-in-place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.

**1.3 QUALITY ASSURANCE**

A. Reference Standards:

- 1. ACI 117 "Specification for Tolerances for Concrete Construction and Materials"
- 2. ACI 211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete."
- 3. ACI 301 "Specifications for Structural Concrete for Buildings."
- 4. ACI 303 "Guide to Cast-in-Place Architectural Concrete Practice."
- 5. ACI 304 "Guide for Measuring, Mixing, Transporting, and Placing Concrete"
- 6. ACI 305 "Hot-Weather Concreting."
- 7. ACI 306 "Cold-Weather Concreting."
- 8. ACI 311 "ACI Manual of Concrete Inspection" and "Guide for Concrete Plant Inspection and Testing of Ready-Mixed Concrete."
- 9. ACI 315 "Details and Detailing of Concrete Reinforcement."
- 10. ACI 318 "Building Code Requirements for Structural Concrete."
- 11. ACI 347 "Guide to Formwork for Concrete."
- 12. ACI SP-15 "Field Reference Manual." A copy of this publication shall be kept in the field office at all times during concrete construction.
- 13. AWS D1.4 "Structural Welding Code - Reinforcing Steel."
- 14. CRSI "Manual of Standard Practice."
- 15. NYSDOT "Standard Specification for Construction and Materials."

- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C 94M requirements for production facilities and equipment.

- 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

- C. Source Limitations: To minimize irregularities in appearance or color, obtain cementitious materials of the same brand from the same manufacturer's plant. Obtain aggregates, admixtures, and water for each type of concrete construction exposed to view in completed project from same source for duration of that type of construction.
- D. Pre-installation Conference: Refer to Specification Section 01 4533 and Schedule of Special Inspections.

#### 1.4 SPECIAL INSPECTIONS

- A. Refer to Specification Section 014533 and Schedule of Special Inspections.

#### 1.5 MATERIAL EVALUATION/QUALITY CONTROL

- A. Preconstruction Testing: Contractor shall employ Testing Agency acceptable to Engineer and Architect to perform material evaluation tests and evaluate concrete mixes prior to submitting.
  - 1. Testing Agency shall be qualified according to ASTM C 1077 and ASTM E329.
- B. Submit concrete testing service qualifications demonstrating experience with similar projects.
- C. Require concrete supplier to provide delivery tickets for each truckload of concrete. Tickets shall be presented to and reviewed by Contractor and Special Inspector or Testing Agency prior to discharging concrete into structure.
  - 1. Tickets shall contain project identification name, name of Contractor, name of concrete supplier, location of batch plant, date and time of concrete batching, truck number, delivery ticket number, concrete type and class, concrete mix number, design compressive strength at 28 days, concrete mix proportions and materials, and amount of total mix design water that can be added at site prior to discharging into structure if total mix design water was not used when batched. See Part 3 of this section for maximum water amount that can be added at site.
- D. The Registered Design Professionals (RDPs) for Structural Engineering and Architecture and the Special Inspector will visit construction site at appropriate intervals to determine if work is in general conformance with Contract Documents and specifications. Notify RDPs 48 hours before anticipated time of completion of reinforcement for a given section of work so they may determine if site observations are required. If site observations are required, do not place concrete until RDPs have had opportunity to observe reinforcement.

## 1.6 SUBMITTALS

### A. Shop Drawings:

1. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Show bar sizes, lengths, material grade, schedules, spacing, diagrams of bent bars, arrangements of reinforcement, splices and laps, mechanical connections, and supports for reinforcement. Include special reinforcement required for openings through concrete.
  - a. Show elevations of reinforcement for all members at minimum 1/4 inch = 1 foot scale.
  - b. Show locations of construction and control joints.
  - c. Reference Contract Drawing number and addendum number in each shop drawing.
  - d. Do not place reinforcing information from more than one design discipline (structural, civil, landscape) in each drawing.

B. Mix Designs: Submit proposed mix designs for concrete 15 days minimum before start of concreting. Submittal must be in the Concrete Mix Design Submittal Form at end of this section for each class of concrete.

C. Submit to Special Inspector and Engineer material certificates signed by manufacturers certifying each material complies with specifications. Submit proposed admixtures including chloride ion content prior to submitting mix design.

D. Submit data and installation instructions for proprietary materials.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials so as to preserve their quality and fitness for work.

1. Store reinforcement and formwork in manner to prevent bending, damage (including damage to coatings) and accumulation of dirt.
2. Store waterstops in a manner to prevent exposure to moisture, sunlight, dirt, oil, and other contaminants.

## 1.8 WORKMANSHIP

A. Contractor shall be responsible for correction of concrete work not conforming to specified requirements, including strength, tolerances, and finishes. Correct deficient concrete as directed by Architect.

B. Remove work found to be defective. Replace with new acceptable work.

## **PART 2 - PRODUCTS**

### **2.1 FORM MATERIALS**

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed/plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown in drawings. Plywood materials shall be one of the following:
  - 1. Overlaid plywood complying with U.S. Product Standards PS 1 "A-C or B-B High Density Overlaid (HDO) Concrete Form," Class 1, exterior grade or better.
  - 2. Plywood complying with U.S. Product Standard PS 1 "B-B (Concrete Form) Plywood," Class 1, exterior grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch minimum.
- F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- G. Form Release Agent: Provide commercial formulation form-coating compounds with maximum VOC of 450 g/l that will not bond with, stain, or adversely affect concrete surfaces or impair subsequent treatments of concrete surfaces requiring bond or adhesion or impede wetting of surfaces to be cured with water or curing compound.
  - 1. Formulate form release agent with rust inhibitor for steel form-facing materials.
- H. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off, metal form ties, designed to prevent form deflection and spalling concrete upon removal. Provide units that will leave no metal closer than 1 inch to exposed surface.
  - 1. Provide ties that will leave holes no larger than 1-inch diameter in concrete surface when removed.
  - 2. Furnish ties with integral water-barrier plates or washers to walls indicated to receive dampproofing or waterproofing.
  - 3. Unexposed concrete: "Type A-3 Snap Tie Standard" by Dayton Superior or accepted equivalent.

4. Exposed concrete: “Type A-3 Snap Tie Heavy” by Dayton Superior or accepted equivalent.
5. Internal wood spreaders are prohibited.

## 2.2 REINFORCING MATERIALS

- A. Deformed bars: ASTM A 615, Grade 60.
- B. Deformed bars to be welded, ASTM A 706.
- C. Steel Wire: ASTM A 82, plain, cold-drawn steel.
- D. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars in place. Use wire bar-type or all plastic-type supports complying with CRSI specifications. Use chairs with sand plates or horizontal runners where base material will not support chair legs.
  1. Concrete bricks may be used to support footing reinforcing. Stagger brick locations.
    - a. Do not use clay bricks.
    - b. Do not use bricks to support epoxy-coated or galvanized reinforcing.
  2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are plastic-protected (CRSI, Class 1) or stainless-steel protected (CRSI, Class 2).
- E. Minimum 16-gauge annealed tie wire, ASTM A 82.
  1. Provide coated tie wire for use with epoxy-coated or galvanized bars. Acceptable coatings include epoxy, nylon, or vinyl. Galvanized tie wire may be used with galvanized bars. Do not use plain tie wire.

## 2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II.
- B. Aggregates: NYSDOT-approved, Section 703 (normal weight), one source and as specified.
  1. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps, or other deleterious substances.
  2. Coarse Aggregate: Clean, uncoated, processed aggregate free from clay, mud, loam, or foreign matter.



- a. For footings, foundation walls, piers, grade beams, basement walls, retaining walls, and interior walls, blend of NYSDOT size 1 and 2 (25 percent size 1 and 75 percent size 2) or gradation conforming to ASTM C 33, size 467:

Sieve Size	Percent Passing
2 inch	100
1 1/2 inch	95 to 100
3/4 inch	35 to 70
3/8 inch	10 to 30
No. 4	0 to 5

- b. For other applications, blend of NYSDOT size 1 and 2 (40 percent size 1 and 60 percent size 2) or gradation conforming to ASTM C 33, size 57:

Sieve Size	Percent Passing
1 1/2 inch	100
1 inch	95 to 100
1/2 inch	25 to 60
No. 4	0 to 10
No. 8	0 to 5

- c. No size requirement for stair-pan fill and lean concrete.

C. Water: ASTM C 94, clean, fresh, drinkable.

D. Fly Ash: ASTM C 618, Type F, with a loss on ignition of less than 6 percent.

E. Ground-Granulated, Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

## 2.4 ADMIXTURES

A. Air Entraining: ASTM C 260.

B. Water-Reducing Admixture: "Eucon WR-75" or "Eucon WR-91" by Euclid Chemical Co.; "MasterPozzolith 200" by Master Builders; or "Plastocrete 161" by Sika Chemical Corp. Admixture shall conform to ASTM C 494, Type A, and not contain more chloride ions than in municipal drinking water.

C. Water-Reducing and Retarding Admixture: "Eucon Retarder-75" by Euclid Chemical Co.; "MasterSet R100" by Master Builders; or "Plastiment" by Sika Chemical Corp. Admixture shall conform to ASTM C 494, Type D, and not contain more chloride ions than in municipal drinking water.

D. Noncorrosive, Nonchloride Accelerator: ASTM C 494, Type C or E, and not contain more chloride ions than in municipal drinking water.

- E. High-Range, Water-Reducing Admixture (Superplasticizer): "Eucon 37" by Euclid Chemical Co. or "Sikament SPMN" by Sika Chemical Corp. Admixture shall conform to ASTM C 494, Type F or G, and not contain more chloride ions than in municipal drinking water.
- F. Prohibited Admixtures: Calcium chloride, thiocyanates, and admixtures containing more than 0.05 percent water-soluble chloride ions by weight of cement or more than 0.3 percent thiocyanates by weight of cement shall not be permitted.

## 2.5 RELATED MATERIALS

- A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 ounces a square yard when dry and complying with AASHTO M 182, Class 2.
- B. Curing-Sheet Materials: One of the following moisture-retaining covers, complying with ASTM C 171. Waterproof paper, polyethylene film, or polyethylene-coated burlap.
- C. Clear Curing and Sealing Compound (VOC compliant): ASTM C 309, Type 1, Class B with minimum 18 percent solids content. Use "Diamond Clear VOX" by Euclid Chemical Co. or accepted equivalent.
- D. Horizontal Joint Sealants: "MasterSeal SL2" by Master Builders; "Sikaflex-2c SL" by Sika Corp.; "Eucolastic 2 SL" by Euclid Chemical Co.; or accepted equivalent.
- E. Vertical Joint Sealants: "Eucolastic 2NS" by Euclid Chemical Co.; "MasterSeal NP2" by Master Builders; "Sikaflex-2c NS" by Sika Corporation; or accepted equivalent.
- F. Joint Filler: ASTM D 1751, ½-inch-thick, premolded, expansion and isolation joint filler strips.
- G. Backer Rod: Polyethylene closed-cell foam. "MasterSeal 920 or 921" by Master Builders or accepted equivalent.
- H. Self-Expanding Butyl Strip Waterstops: "Waterstop-RX," 1 inch by ¾ inch, by CETCO or accepted equivalent at below-grade wall construction joint locations and at locations shown in drawings.
- I. PVC Waterstops: Polyvinyl Chloride, dumbbell-type or center bulb-type, conforming to Corps of Engineers CRD-C 572. "Wirestop CR-6380" or "Wirestop FD-6380" by Paul Murphy Plastics Company; "Sealtight PVC Waterstop 6380" by W.R. Meadows; or accepted equivalent at below-grade wall control joint locations and at locations shown in drawings.
- J. Chamfer Strips: Provide wood, metal, PVC, or rubber chamfer strips fabricated to provide ¾-inch chamfer on exposed edges.

- K. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.022-inch-thick (26-gauge) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- L. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.
- M. Sleeves:
  - 1. Schedule 40, PVC for 12-inch diameter or smaller.
  - 2. ASTM A 53, hot-dip galvanized for larger than 12-inch diameter.
- N. Anchor Rods and Leveling Plates: Furnished in Division 06 and installed under this section.
- O. Non-shrink Grout: Corp of Engineers CRD-C 621. "Sure-Grip High Performance Grout" by Dayton Superior; "NS Grout" by Euclid Chemical Co.; "SikaGrout 212" by Sika Corp.; "Masterflow 928" by Master Builders, Inc.; or accepted equivalent.
- P. Bonding Agent: ASTM C 1059, Type II "Acrylic Bonding Agent J40" by Dayton Superior; "SBR Latex" by Euclid Chemical Co.; "Everbond" by L&M Construction Chemicals, Inc.; "SikaLatex" by Sika Corp.; or accepted equivalent.
- Q. Chemical Adhesive for Doweled Reinforcement:
  - 1. Anchors to solid concrete, grouted CMU, solid brick, or stone:
    - a. Anchors for use when base material temperature is 0°F or greater: "HIT-Ice" by Hilti; "Epcon A7" by ITW Ramset/Red Head; "AC 100 + Gold" by Powers Fasteners; "AT-XP" by Simpson/Strong-Tie; or accepted equivalent.
    - b. Anchors for use when base material temperature is 40°F or greater; "HIT HY 200" by Hilti; "Epcon C6+" by ITW Ramset/Red Head; "PE 1000+" by Powers Fasteners; "ET-HP" by Simpson/Strong-Tie; or accepted equivalent.

## 2.6 PROPORTIONING AND MIX DESIGN

- A. Prepare design mixtures for type and strength of concrete. Use independent testing facility acceptable to Architect for preparing and reporting proposed mix designs.
- B. Where concrete production facility can establish uniformity of its production for concrete of similar strength and materials based on recent test data, the average strength used as a basis for determining mix design proportions shall exceed specified design strength by requirements of ACI 318, Section 5.3.2.1 or ACI 301, Section 3.9.
- C. When a concrete production facility does not have field-test records for calculation of standard deviation, the required average strength shall be determined in accordance with ACI 318, Section 5.3.2.2.

D. Pozzolans:

1. Pozzolans may be substituted for cement in normal-weight concrete, including fly ash, at a maximum rate of 20 percent by weight or ground-granulated, blast-furnace slag at a maximum rate of 35 percent by weight.
2. Submittals shall include actual mix design, including percentage of pozzolans and test results showing mix meets specified 7-day compressive strength where indicated, 28-day compressive strength, and air content.
3. Protect and heat concrete containing pozzolans during cold-weather conditions. Maintain protection and heat until 70 percent of specified design strength is achieved.

E. Quantity of coarse aggregate in pounds must be in the range of 1.25 to 1.5 times quantity of fine aggregate in pounds.

F. Concrete Quality:

<b>Location</b>	<b>Required 7-day Compressive Strength psi</b>	<b>Required 28-day Compressive Strength psi</b>	<b>Maximum Water/Cement Ratio</b>	<b>Percent Entrained Air</b>
Footings, interior stair pans, misc. concrete.	NA	3,000	0.55	4.5*
Retaining walls, basement walls, interior walls, foundation walls, piers, grade beams, underpinning.	3,000	4,000	0.5	4.5*
Lean concrete	NA	1,500	0.65	4.5*

\* Plus or minus 1.5 percent.

G. Slump:

1. Footings, foundation walls, piers, grade beams, misc. concrete: 3 inches to 5 inches.
2. Retaining walls, basement walls, interior walls: 4 inches maximum.
3. Concrete containing high-range, water-reducing admixture (superplasticizer) shall have a maximum slump of 9 inches unless otherwise accepted by Engineer.

4. Type G superplasticizer may be added at plant if adequate quality control measures are implemented to verify slump and admixture quantities at plant before addition of superplasticizer. Concrete shall maintain required slump during transportation and placement. Quality control testing at plant shall be performed by an independent testing laboratory employed by Contractor and acceptable to Architect.
5. Ready-Mix Concrete: ASTM C 94.
6. Provide batch ticket for each batch discharged and used in work indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.

## **2.7 REINFORCING FABRICATION**

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice." Fabricate bars to required lengths, shapes, and bends. Do not rebend or straighten reinforcement in manner that could weaken material.

## **PART 3 - EXECUTION**

### **3.1 JOB CONDITIONS**

- A. Examine conditions under which concrete shall be placed. Do not proceed with work until unsatisfactory conditions are corrected.

### **3.2 FORMWORK INSTALLATION**

- A. General: Design, erect, shore, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347 and ACI 117.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, sleeves, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent concrete mortar leakage.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, etc., for easy removal.
- D. Erect forms in logical sequence to allow placement and inspection of reinforcement and other embedded items.

- E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for concrete placement. Securely brace temporary openings, and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- F. Provide cleanout panels at bottoms of deep wall and column forms.
- G. Chamfer exposed corners and edges as indicated using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- H. Fit corners and joints with gaskets or tape to prevent leakage.
- I. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- J. Sleeves: Provide sleeves in concrete formwork for plumbing, electrical, and mechanical penetrations. Coordinate size and location of sleeves with Contractors and mechanical, electrical, and plumbing drawings.
  - 1. Accurately place and secure in forms.
  - 2. Coordinate sleeve locations with reinforcing bars.
  - 3. Penetrations shall not occur through footings, piers, columns, beams, joists, grade beams, or supported slabs unless shown in structural drawings.
- K. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before placing concrete as required to prevent mortar leaks and maintain proper alignment.
- L. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form-facing materials are not acceptable. Apply new form-release agent. When forms are reused for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets. Do not use patch forms for exposed concrete surfaces unless approved by Architect.
- M. Clean and coat forms before erection. Do not coat forms in place.
- N. Place concrete plugs in exposed holes left by form-tie cones.

### 3.3 STEEL REINFORCEMENT PLACEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

- B. Clean reinforcement of loose rust, mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, hangers, or concrete brick as required.
  - 1. Wire-tie intersections as required to prevent displacement of reinforcement.
  - 2. Do not wet set reinforcing bars. Wet setting is not permitted.
- D. Place reinforcement to obtain at least minimum concrete coverages for protection of bars. Minimum required concrete cover is noted in drawings.
- E. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- F. Use of nails in forms and use of clay brick to support reinforcement is prohibited.
- G. Lap bar splices as indicated. Stagger splices in adjacent bars. Wire-tie splices.
- H. At points where bars lap-splice, including distribution steel, provide wire-tied minimum lap of 30-bar diameters unless otherwise required.
- I. Coordinate placement of reinforcement with openings, including sleeves and other embedded items. Where one or more bars are interrupted, provide additional reinforcement at openings. Additional reinforcement is noted in drawings.
- J. Place concrete in manner to ensure alignment of elements remains unchanged.
- K. Comply with manufacturer-recommended procedures for installing and anchoring of doweled reinforcement using chemical adhesives, including drilling and cleaning of holes and mixing and applying of adhesives.

### 3.4 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into work anchorage devices and other embedded items including anchor rods, leveling plates, embedded plates, and angles required for other work attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto.
- B. Do not wet set embedded items. Accurately position, support, and secure embedded items against displacing by formwork, construction, or concrete placement operations.

1. Provide No. 3 rebar ties at top and bottom of anchor rods to maintain position or other accepted method.
- C. Anchor rods and embedded structural supports incorrectly located or damaged after installation shall be field modified, including repair or replacement, by Contractor.
1. Notify Engineer of defective work. Submit proposed field modifications to Engineer for review and acceptance prior to making corrections.
  2. Proposed field modifications shall include design details and calculations, signed and sealed by a licensed Professional Engineer hired by Contractor.
  3. Field modifications shall be tested in accordance with Division 06. Perform pull-out tests and other appropriate tests on each repair.
  4. Cost of field modifications shall be borne entirely by Contractor at no additional cost to Owner. Contractor shall reimburse Owner for cost of additional testing required.

### 3.5 INSTALLATION OF NON-STRUCTURAL EMBEDDED ITEMS

- A. General: Notify other trades to permit installation of their work, including reglets, conduit, and piping and to coordinate requirements of this section. Cooperate with other trades in setting work as required.
- B. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings on outer face of exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. ACI 318, Article 6.3, and guidelines listed below apply to conduit and piping.
1. Do not embed aluminum items unless coated or covered to prevent aluminum-concrete reaction or electrolytic action between aluminum and steel.
  2. Other than those passing through concrete elements, do not embed items that are larger than one-third of thickness of concrete element in which they are embedded.
  3. Unless shown otherwise in structural drawings, install items as follows:
    - a. Space at least 12 inches apart and not less than three diameters or widths on center.
    - b. Place so they do not cross over each other within concrete elements.
    - c. Place so they do not displace reinforcing bars from their proper location.
    - d. Provide at least 3/4-inch concrete cover between items and reinforcing bars or concrete surfaces not exposed to weather or in contact with ground. Do not lay items on reinforcing bars. Provide at least 1½-inches concrete cover between items and concrete surfaces exposed to weather or earth.
    - e. Securely position items by wire tying to support chairs or supports formed from reinforcing bars.
    - f. Install sleeves at penetrations for nonstructural items passing through concrete elements.



### 3.6 PREPARATION OF FORM SURFACES

- A. General: Coat contact surfaces of forms with an accepted form-coating compound before placing reinforcement.
- B. Do not allow excess form-coating material to accumulate in forms or to come in contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- C. Coat steel forms with a nonstaining, rust-preventive material. Rust-stained steel formwork is not acceptable.

### 3.7 CONSTRUCTION JOINTS

- A. Construct joints true to line with faces perpendicular to surface plane of concrete. Locate and install construction joints so strength and appearance of concrete are not impaired, at locations indicated or acceptable to Architect.
  - 1. Provide keyways at least 1-1/2 inches deep in construction joints in walls. Roughen joints between reinforced concrete walls and footings to a minimum 1/4-inch amplitude and remove dirt and concrete laitance prior to casting concrete walls.
  - 2. Space vertical joints in walls as indicated in drawings. If not indicated, space joints a maximum of 60 feet and locate beside piers integral with walls, near corners, and in concealed locations where possible.
  - 3. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as otherwise indicated. Do not continue reinforcement through sides of strip placements.
  - 4. Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  - 5. Provide water stops in construction joints below grade and where indicated. Install water stops to form continuous diaphragm in each joint. Make provisions to support and protect exposed water stops during progress of work. Field-fabricate joints in water stops in accordance with manufacturer's printed instructions.

### 3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement and embedded items is complete and required inspections have been performed.
  - 1. Notify other trades to permit installation of their work. Cooperate with other trades in setting work as required.
- B. General: Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete" and as specified.

- C. A maximum of 2 1/2 gallons for each cubic yard of total mix design water can be added in field. Water must be added prior to discharging and testing concrete. At no time shall total water exceed amount listed in accepted mix design.
- D. Deposit concrete continuously in one layer or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause formation of seams or planes of weakness within section. Provide construction joints if section cannot be placed continuously.
- E. Deposit concrete as nearly as practicable to its final location to avoid segregation caused by rehandling or flowing.
- F. Deposit concrete in forms in horizontal layers not deeper than 24 inches and in manner to avoid inclined construction joints.
- G. Keep excavations free of water. Do not deposit concrete in water, mud, snow, or on frozen ground.
- H. Maximum drop of concrete shall not exceed 5 feet. Use hopper and trunk for greater drops.
- I. Maintain reinforcing in proper position during concrete placement.
- J. Contractor shall be responsible for controlling the proper placing of embedded pipe, conduit, and other embedded items. See section "Installation of Non-Structural Embedded Items" for additional information.
- K. Pumping concrete is permitted only if mix designs specifically prepared and used previously for pumping are submitted. Pump line shall have 5-inch-minimum inside diameter and be used with 5-inch pumps.

### 3.9 CONSOLIDATION

- A. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
- B. Do not use vibrators to transport concrete inside formwork.
- C. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Vibrators shall penetrate placed layer of concrete at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set.
- 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 segregation of mix.

- E. Do not allow vibrator to come in contact with form.

### 3.10 SURFACE FINISHES

- A. Rough-Form Finish: Provide as-cast, rough-form finish to formed concrete surfaces that shall be concealed in finished work or by other construction. Standard rough-form finish is concrete surface having texture imparted by form-facing material used, with tie holes and other defective areas repaired and patched, and fins or other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth-Form Finish: Provide smooth-form finish for formed concrete surfaces that shall be exposed to view or covered with material applied directly to concrete such as waterproofing, dampproofing, veneer plaster, painting, or other similar systems. Produce smooth-form finish by selecting form material to impart a smooth, hard, uniform texture and arranging them orderly and symmetrically with minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- C. Smooth-Rubbed Finish: Provide smooth-rubbed finish to scheduled smooth-form finished concrete surfaces not later than one day after form removal.
  - 1. Moisten smooth-form finished concrete surfaces, and rub with carborundum brick or other abrasive until uniform color and texture are produced.
  - 2. Do not apply cement grout other than that created by the rubbing process.
- D. Grout-cleaned Finish: Provide grout-cleaned finish to scheduled smooth-form finished concrete surfaces.
  - 1. Combine 1 part portland cement to 1 1/2 parts fine sand by volume and a 1:1 mixture of acrylic or styrene butadiene-based bonding admixture and water to consistency of thick paint. Blend standard portland cement and white portland cement, amounts determined by trial patches, so that final color of dry grout shall match adjacent surfaces.
  - 2. Thoroughly wet smooth-form finished concrete surfaces. Apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike off smooth and finish with texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.11 CONCRETE PROTECTING AND CURING

- A. Protect freshly placed concrete from premature drying, excessive hot or cold temperature, and damage in accordance with provisions of ACI 306 for cold-weather project and ACI 305, for hot-weather protection.

B. Curing Methods: Perform concrete curing in accordance with ACI 308 by wet-curing or moisture-retaining cover curing or combinations thereof as specified.

C. Provide wet-curing by following methods:

1. Keep concrete surface continuously wet by covering with water.
2. Use continuous water-fog spray.
3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges with 4-inch lap over adjacent absorptive covers.

D. Provide moisture-retaining-cover curing as follows:

1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair holes or tears during curing period using cover material and waterproof tape.

E. Curing Vertical-Formed Surfaces:

1. Keep forms in place for minimum of 7 days, 14 days in cold weather or until concrete has achieved 70 percent of its design strength.
2. If forms are removed before minimum time period, alternate methods of curing, wet-curing, moisture-retaining-cover curing, or liquid-membrane curing, are required.
  - a. Contractor shall submit procedures to Architect for review.
  - b. Forms shall remain in place for a minimum of 24 hours when alternating methods of curing are used. For placement during cold weather, the minimum time to form removal shall be extended based on expected weather conditions and Contractor's submitted procedures.

F. Cure concrete placed under cold-weather conditions completely covering exposed surface of concrete with moisture-retaining cover completely sealed around edges. Cure concrete 14 days minimum with concrete temperature at or above 40 degrees F or 7 days minimum with concrete temperature at or above 70 degrees F.

G. During hot weather after concrete has hardened, loosen form ties, keeping forms in place, and apply water to inside face of form to keep concrete continuously moist.

### 3.12 COLD-WEATHER CONCRETING

A. Place concrete in accordance with ACI 306.

- B. For cold-weather concreting (defined as a period when for more than 3 successive days the mean daily temperature is below 40 degrees F), maintain concrete temperature in accordance with Table 3.1, and maintain concrete protection in accordance with Table 5.3 in "Cold-Weather Concreting" reported by ACI Committee 306.
- C. When air temperature has fallen to or is expected to fall below 40 degrees F (4 degrees C), uniformly heat water and aggregates before mixing to obtain concrete mixture temperature recommended in Table 3.1 of ACI 306.
  - 1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  - 2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators.

### 3.13 HOT-WEATHER CONCRETING

- A. Place concrete in accordance with ACI 305.
- B. Cool ingredients before mixing to maintain concrete temperature below 85 degrees F at time of placement.
- C. Mixing water may be chilled or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water.
- D. Cover reinforcing steel with water-soaked burlap if temperature of reinforcing steel exceeds ambient air temperature.
- E. Wet forms thoroughly before placing concrete.
- F. Fog-spray forms and reinforcing steel just before placing concrete.
- G. Use water-reducing, retarding admixture when required by high temperature, low humidity, or other adverse placing conditions when acceptable to Architect.

### 3.14 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after form removal when acceptable to Architect.
  - 1. Cut out honeycombs, rock pockets, voids over 1/2 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but not to a depth of less than 1 inch. Make edges of cuts perpendicular to concrete surface. Thoroughly clean, dampen with water, and brush-coat area to be patched with bonding agent. Place patching mortar before bonding compound has dried.

2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so patching mortar will match surrounding color when dry. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
- B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. These include surface defects such as color, texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form-tie holes, and fill with dry-pack mortar or precast-cement cone plugs secured in place with bonding agent.
1. Where possible, repair concealed formed surfaces containing defects affecting concrete durability. If defects cannot be repaired, remove and replace concrete.
- C. Repair of Unformed Surfaces: Test unformed surfaces for smoothness, and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using template having required slope.
1. Repair finished unformed surfaces containing defects affecting concrete durability. These include surface defects such as crazing, cracks, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
- D. Repair methods not specified above may be used subject to acceptance of Architect.

### 3.15 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades unless otherwise shown or directed after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling required to complete work.
- B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown in drawings. Coordinate sizes and locations with equipment supplied. Prior to placing concrete, set anchorage devices for machines and equipment using setting drawings, templates, diagrams, instructions and directions furnished with the equipment.

### 3.16 TOLERANCES

- A. Piers, Columns, Walls, and Grade Beams:
1. Variation in cross-sectional dimensions of piers, columns, grade beams, and in thickness of walls: plus or minus 1/4 inch.
  2. Variation in plan from specified location in plan: plus or minus 1/2 inch for any member in any location.

3. Deviation in plan from straight lines parallel to specified linear building lines: 1/4 inch for adjacent members less than 20 feet apart or any wall length less than 20 feet; 1/2 inch for adjacent members 20 feet or more apart or any wall length of 20 feet and greater.
4. Deviation from plumb: 1/4 inch for any 10 feet of height; 1 inch maximum for entire height.
5. Variation in elevation from specified elevation: plus or minus 1/2 inch for any member in any location.
6. Deviation in elevation from lines parallel to specified grade lines: 1/4 inch for adjacent members less than 20 feet apart or any wall length less than 20 feet; 1/2 inch for adjacent members 20 feet or more apart or any wall length of 20 feet and greater.

**B. Anchor Rods and Sleeves:**

1. Variation from specified location in plan: plus or minus 1/4 inch.
2. Variation from specified elevation: plus or minus 1/2 inch.

**C. Embedded Items (plates, angles, etc.) other than anchor rods and sleeves:**

1. Variation from specified location in plan: plus or minus 1/4 inch.
2. Variation from specified elevation: plus or minus 1/4 inch.

## CONCRETE MIX DESIGN SUBMITTAL FORM

Submit separate form for each mix design

Project: \_\_\_\_\_ Location: \_\_\_\_\_

General Contractor: \_\_\_\_\_ Concrete Supplier: \_\_\_\_\_

Mix Design No: \_\_\_\_\_ Concrete Grade: \_\_\_\_\_

Use (Describe): \_\_\_\_\_

Methods of Placement (chute, pump, chute and buggy, etc.): \_\_\_\_\_

If placing by pumping, verify concrete mix can be pumped distances required in project: \_\_\_\_\_

### A. DESIGN MIX INFORMATION:

Based on Standard Deviation Analysis: \_\_\_\_\_ or Trial Mix Design Data: \_\_\_\_\_

Design Characteristics - Density: \_\_\_\_\_ pcf; Strength: \_\_\_\_\_ psi (28-day);

Slump: \_\_\_\_\_ in. required BEFORE adding superplasticizer (if used)

Slump: \_\_\_\_\_ in. required AFTER adding superplasticizer (if used)

Entrained Air Content: \_\_\_\_\_ % specified

#### Materials:

Aggregates: (size; type; source; gradation; specification)

Coarse: \_\_\_\_\_

Fine: \_\_\_\_\_

<u>Other Materials:</u>	<u>Type</u>	<u>Product-Manufacturer (Source)</u>
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Cement:	_____	_____
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Fly Ash:	_____	_____
----------	-------	-------

Slag:	_____	_____
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#### Admixtures:

Water Reducer: \_\_\_\_\_

Air-Entraining Agent: \_\_\_\_\_

High-Range, Water-Reducing Admixtures (superplasticizer): \_\_\_\_\_

Non-Corrosive Accelerator: \_\_\_\_\_

Other: \_\_\_\_\_



**B. FINAL MIX DESIGN DATA:**RATIOS

Water \_\_\_\_\_ lb  
Cementitious Materials lb = \_\_\_\_\_

Course Agg. \_\_\_\_\_ lb  
Fine Agg. \_\_\_\_\_ lb = \_\_\_\_\_

SPECIFIC GRAVITIES

Fine Agg. \_\_\_\_\_

Coarse Agg. \_\_\_\_\_

Other: \_\_\_\_\_

ADMIXTURES

W.R.: \_\_\_\_\_ oz. per 100 # Cement

HRWR: \_\_\_\_\_ oz. per 100 #Cement

Non-Corrosive Accelerator: \_\_\_\_\_ oz.  
Per 100# Cement

A.E.A.: \_\_\_\_\_ oz. per 100 # Cement

Other: \_\_\_\_\_ oz. per 100# Cement

PLASTIC CONCRETE

Initial Slump = \_\_\_\_\_ in. Air Content = \_\_\_\_\_ %

Final Slump = \_\_\_\_\_ in. Unit Dry Wt. = \_\_\_\_\_ pcf

Unit Wet Wt. = \_\_\_\_\_ pcf

MIX PROPORTIONS

WEIGHT (LBS.) ABSOLUTE VOL. (CU. FT.)

Cement: \_\_\_\_\_

Fly Ash: \_\_\_\_\_

Slag: \_\_\_\_\_

Fine Aggregate: \_\_\_\_\_

Coarse Aggregate: \_\_\_\_\_

Water: \_\_\_\_\_

Entrained Air: \_\_\_\_\_

Other: \_\_\_\_\_

TOTALS: \_\_\_\_\_

STANDARD DEVIATION ANALYSIS (from experience records):

Number of Test Cylinders Evaluated: \_\_\_\_\_ Standard Deviation: \_\_\_\_\_

$f_{cr} = f_c + 1.34s$  or  $f_{cr} = f_c + 2.33s - 500$

(Refer to ACI for increased deviation factor when fewer than 30 tests are available.)

Mix # \_\_\_\_\_ Job Name \_\_\_\_\_

**C. LABORATORY TEST DATA (HARDENED CONCRETE):**

**COMPRESSIVE STRENGTH**

Age (days)	Mix #1	Mix #2	Mix #3
7	_____	_____	_____
14	_____	_____	_____
28	_____	_____	_____
Other	_____	_____	_____

28-day average compressive strength: \_\_\_\_\_psi

Mix design proportioned to achieve  $f_{cr} = f_c + 1200$  psi (1400 psi for strength higher than 5000 psi at 28 days)

**CHLORIDE ION CONTENT:** \_\_\_\_\_

Remarks: \_\_\_\_\_

NOTE: Fill in all blank spaces. Use 0- (Zero) or N.A. (Not Applicable) where appropriate. See "Design and Control of Concrete Mixtures," 13<sup>th</sup> Edition by Portland Cement Association, for assistance in completing this form.

**D. REQUIRED ATTACHMENTS:**

\_\_\_\_\_ Coarse aggregate gradation report and DOT certification  
\_\_\_\_\_ Fine aggregate gradation report and DOT certification  
\_\_\_\_\_ Concrete compressive strength data used for standard deviation calculations  
\_\_\_\_\_ Chloride ion data and related calculations  
\_\_\_\_\_ Rapid chloride permeability test report  
\_\_\_\_\_ Admixture compatibility certification letter

Submitted by

Ready-Mix

Supplier: Name \_\_\_\_\_

Address \_\_\_\_\_

Phone Number \_\_\_\_\_ Date \_\_\_\_\_

Main Plant Location \_\_\_\_\_ Miles from Project \_\_\_\_\_

Secondary Plant Location \_\_\_\_\_ Miles from Project \_\_\_\_\_

**END OF SECTION 03 3000**

**SECTION 03 3020**  
**CONCRETE SLAB ON GRADE**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.
- B. Section 03 3000: Cast-In-Place Concrete.
- C. Vapor retarder is specified in Section 31 2301.

**1.2 DESCRIPTION OF WORK**

- A. This section supplements Section 03 3000: Cast-In-Place Concrete, with specific emphasis on concrete slabs on grade. The general requirements of Section 03 3000 pertain to this section unless otherwise specified in this section.

**1.3 QUALITY ASSURANCE**

A. Reference Standards:

- 1. ACI 302 "Guide for Concrete Floor and Slab Construction."
- B. Hold a slab preconstruction meeting at least 14 days prior to initial planned date of slab placement. Discussion shall include subbase preparation, reinforcing and dowel placement, slab joints, concrete mix designs, and procedures for concrete placement, finishing, curing, and protection. Attendees shall include Contractor, Placement Subcontractor, Concrete Supplier, Special Inspector, Testing Agency, Engineer, and Architect.
- C. Provide protection from precipitation for vapor retarder and slab subbase prior to slab-on-grade placement. Provide protection for slab on grade from direct exposure to sun, wind, precipitation, and excessive cold or hot temperatures starting during placement and lasting until end of curing period.
- 1. After curing period, provide protection from precipitation for slab openings (column blockouts, mechanical blockouts, expansion/isolation joints, etc.) to prevent moisture from entering slab subbase.
  - 2. Contractor shall be responsible for cost of repairing slab defects resulting from deficient protection methods.
  - 3. One method of protection is installing roof membrane and roof drains prior to installing vapor retarder, slab subbase, and slab on grade.

## 1.4 SPECIAL INSPECTIONS

- A. Refer to Specification Section 01 4533 and Schedule of Special Inspections.

## 1.5 SUBMITTALS

- A. Comply with Section 033000.
- B. Prior to slab placement, submit to Special Inspector and Engineer for information only a written protection program for vapor retarder, slab subbase, and slab on grade.

## PART 2 - PRODUCTS

### 2.1 STEEL REINFORCEMENT AND ACCESSORIES

- A. Reinforcement: ASTM A 615, Grade 60 for uncoated deformed bars.
  - 1. ASTM A 775 for epoxy-coated, deformed bars.
- B. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775.
- C. Supports for Reinforcement: Use wire bar-type supports complying with CRSI specifications. Use chairs with sand plates or horizontal runners where base material will not support chair legs.
  - 1. Concrete bricks may be used to support reinforcing. Stagger brick locations.
    - a. Do not use clay bricks.
    - b. Do not use bricks to support epoxy-coated or galvanized reinforcing.
  - 2. Supports for epoxy-coated reinforcing shall be either wire bar-type coated with epoxy, plastic, or vinyl compatible with concrete for minimum distance of 2 inches from point of contact with reinforcing or all plastic-type.
  - 3. Finish for supports formed from reinforcing bars shall match finish of supported reinforcing.
- E. Minimum 16-gauge annealed tie wire, ASTM A 82.
- F. Deformed-Steel Wire: ASTM A 496/A 496M.
- G. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A, Type 1 coated, plain steel wire, with less than 2 percent damaged coating in each 12-inch wire length.
  - 1. Provide coated wire ties for use with epoxy-coated or galvanized bars. Acceptable coatings include epoxy, nylon, or vinyl. Galvanized wire ties may be used with galvanized bars. Do not use plain wire ties.

## 2.2 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150. Type II or Type I/II only.
- B. Fly Ash: ASTM C 618, Type F, with loss on ignition of less than 6 percent.
- C. Ground-Granulated, Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- D. Water: ASTM C 94, clean, fresh, drinkable.
- E. Aggregates: NYSDOT-approved, Section 703-02 (normal weight), one source and as herein specified.
  - 1. Fine Aggregate: Coarse, clean, sharp, uniformly graded natural sand free of loam, clay, lumps or other deleterious substances. Less than 10 percent passing No. 100 sieve and less than 3 percent passing No. 200 sieve.
  - 2. Coarse Aggregate: Uniformly graded to 1 1/2 inches, clean, processed, crushed stone with low absorption and free of flat/elongated particles. NYSDOT-approved, size 3A gravel can be used to meet large diameter requirement. Gradation similar to blended NYSDOT Type CA 2 and size 1A or ASTM C 33 Type 57 and Type 8, blended and modified as follows:

Sieve Size	Percent Passing
1 inch	95 to 98.5
3/4 inch	75 to 94
1/2 inch	25 to 50
3/8 inch	10 to 25
No. 4	0 to 10

## 2.3 ADMIXTURES

- A. Air Entraining: ASTM C 260.
- B. Set-Control Admixtures: Not permitted.
- C. Calcium Chloride: Not permitted.
- D. High-Range, Water-Reducing Admixture (Superplasticizer): “Eucon 37” by Euclid Chemical Co.; or “Sikament SPMN” by Sika Chemical Corp. Admixture shall conform to ASTM C 494, Type F or G, and not contain more chloride ions than in municipal drinking water.
- E. Water-Reducing Admixture: “Eucon WR-75” or “Eucon WR-91” by Euclid Chemical Co.; “MasterPozzoloth 200” by Master Builders; or “Plastocrete 161” by Sika Chemical Corp. Admixture shall conform to ASTM C 494, Type A, and not contain more chloride ions than in municipal drinking water.

- F. Mid-Range, Water Reducer/Finish Enhancer: ASTM C 494, Type A/F. “Daracem 55” or “Daracem 65” by W.R. Grace or accepted equivalent.

## 2.4 RELATED MATERIALS

- A. Premolded Joint Filler: Provide resilient and nonextruding, premolded, bituminous fiberboard units complying with ASTM D 1751; 1/2-inch-thick, full slab depth.
- B. Construction Joint Form: Square edge form only. Keyed joint not permitted.
- C. Semi-Rigid Epoxy Joint Filler for Interior Exposed Slabs: At exposed slabs, seal joints with “Sikadur 51SL” by Sika; “Sure Fil J52” by Dayton Superior; “MM-80P” by Metzger/McGuire; “Euco 700” by Euclid Chemical Co.
- D. Polyurethane Joint Sealant for Exterior Slabs: “Sikaflex-2c SL” by Sika; “MasterSeal SL2” by Master Builders; “Eucolastic 2 SL” by Euclid Chemical Co.; “Urexpan NR-200” by Pecora Corporation; or accepted equivalent.
- E. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 ounces a square yard and complying with AASHTO M 182, Class 2.
- F. Curing-Sheet Materials: ASTM C 171; waterproof paper, polyethylene film, or polyethylene-coated burlap.
1. For slabs exposed to view, provide one of the following or accepted equivalent:
    - a. “HydraCure S16” by PNA Construction Technologies.
    - b. “UltraCure NCF/SUN” by McTech Group.
- G. Penetrating Exterior Anti-Spalling Sealer: “Euco-Guard 100” by Euclid Chemical Co. (mixed to 17.5 percent concentration); “MasterProtect H400” by Master Builders; “Aquapel Plus” by L&M Construction Chemicals; or accepted equivalent.
- H. Evaporation Retarder: Monomolecular, film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss. “Aquafilm J74RTU” by Dayton Superior; “Eucobar” by Euclid Chemical Co.; “MasterKure ER 50” by Master Builders, Inc.; or accepted equivalent.
- I. Crack Repair Material: For cracks smaller than 1/8 inch, use “Sika Pronto 19” methacrylate by Sika; “Rapid Refloor” polyurea by Metzger McGuire; or accepted equivalent. For cracks greater than 1/8 inch, use specified joint filler material.
- J. Hardener: “Lapidolith” by Sonneborn Building Products or accepted equivalent for exposed slabs.

## 2.5 PROPORTIONING AND MIX DESIGN

### A. Concrete Quality:

Location	Required 28-Day Compressive Strength (psi)	Approximate Cementitious Materials Content (pounds)	Maximum Water/Cement Ratio	Percent Entrained Air
Interior slabs on grade	3,500	530	0.50 (265 pounds maximum total water)	2*
Exterior slabs on grade	4,500	611***	0.45	6**

\* Do not add air-entraining admixtures. Air entrainment occurs as result of mixing.

\*\* Plus or minus 1.5 percent.

\*\*\* Maximum cement content 526 pounds plus 20 percent pozzolans by weight.  
Minimum cement content 488 pounds plus 20 percent pozzolans by weight.

B. Slump: 5-inch maximum for normal and mid-range, water-reduced mixes.

C. Concrete containing a high-range, water-reducing admixture (superplasticizer) shall have maximum slump of 6 inches unless otherwise accepted by Engineer.

D. Use 564 pounds (6 sacks) maximum of cement for each cubic yard for interior slabs and minimum sand content.

E. Quantity of coarse aggregate in pounds must be in range of 1.25 to 1.5 times quantity of fine aggregate in pounds. Provide minimum of 1,800 pounds of coarse aggregate for each cubic yard of concrete.

### F. Pozzolans:

1. Pozzolans may be substituted for cement in normal-weight concrete for interior slabs, including fly ash at a maximum rate of 20 percent by weight or ground-granulated, blast-furnace slag at a maximum rate of 35 percent by weight.
2. Pozzolans shall be used at a rate of 20 percent by weight of total cementitious materials for exterior slabs.
3. Submittals shall include actual mix design, including percentage of pozzolans and test results showing mix meets specified 7-day compressive strength where indicated, 28-day compressive strength, and air content.
4. Protect and heat concrete containing pozzolans during cold-weather conditions. Maintain protection and heat until 70 percent of specified design strength is achieved.

G. Pumping concrete is permitted only if mix designs specifically prepared and used previously for pumping are submitted. Mix designs not previously used for anticipated pump line lengths shall be tested by Contractor to verify suitability for project before use at site. Pump line shall have 5-inch-minimum inside diameter and be used with 5-inch pumps.

H. Water vapor reducing admixture shall be used in interior slabs.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

A. Examine conditions under which work shall be performed. Do not proceed with work until unsatisfactory conditions are corrected.

### **3.2 PRECONCRETE PLACEMENT**

A. Just before concrete placement, slab subbase shall be dry.

B. Whenever possible, air temperature should be rising after concrete placement. Attempt to schedule slab placements according to favorable weather reports.

C. Subgrade shall be frost-free.

### **3.3 EDGE FORMS AND SCREED STRIPS FOR SLABS**

A. Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surfaces. Provide secure edge forms or screed strips to support strike-off templates or compacting vibrating-type screeds. Wet screeding is not permitted.

### **3.4 REINFORCEMENT PLACEMENT**

A. Dedicate workers to placement of reinforcement to continuously monitor and adjust reinforcement location during concrete placement.

B. Touch up damaged epoxy-coated reinforcement in field after placement with epoxy patching material provided by coating manufacturer.

### **3.5 ISOLATION JOINTS**

A. Construct isolation joints in slabs on grade at points of contact with vertical surface and elsewhere as indicated.

### **3.6 CONSTRUCTION JOINTS**

A. Locate and install construction joints not shown in drawings so as not to impair strength and appearance of structure as acceptable to Engineer.



### 3.7 PLACING CONCRETE SLABS

- A. Maximum of 2 1/2 gallons for each cubic yard of total mix design water can be added in field. Water must be added prior to discharging and testing concrete. At no time shall total water exceed amount listed in accepted mix design.
- B. Use strip pour methods and mechanical vibratory screed whenever possible.
- C. Deposit and consolidate concrete in continuous operation within limits of construction joints until placing of panel or section is complete.
- D. Consolidate concrete during placing operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
- E. Bring slab surfaces to correct level with a straightedge and strike off. Uniformly slope to drains. Use darbies to smooth surface, leaving it free of humps or hollows. Do not sprinkle water or portland cement on plastic surface. Do not disturb slab surfaces before beginning finishing operations.
- F. Maintain reinforcement in proper position during concrete placement operations. See requirements for reinforcement placement.
- G. Slab thicknesses shown in drawings are minimum allowable. Maximum allowable thickness shall be 1 inch greater than specified thickness.
- H. For floor areas with drains, Contractor shall be responsible for finishing concrete slabs to proper elevations to ensure surface moisture will drain freely to floor drains and no puddle areas exist. Reference elevations shown in drawings.
- I. Cost of corrections to provide positive drainage shall be responsibility of Contractor.

### 3.8 SLAB FINISHES

- A. Float Finish: Apply power float finish to slab surfaces that will subsequently be trowel finished or covered with waterproofing membrane. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating using float blade or float shoes when surface water has disappeared, when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to overall tolerances of  $F_F$  18 and  $F_L$  13, and minimum local tolerances of  $F_F$  13 and  $F_L$  10. Cut down high spots and fill low spots. Uniformly slope surface to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

B. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin-film finish-coating system. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation. Surface shall be free of trowel marks, uniform in texture and appearance, and leveled to an overall tolerance of  $F_F$  25 and  $F_L$  20 and minimum local tolerance of  $F_F$  17 and  $F_L$  13 for carpet and ceramic or quarry tile finishes and overall tolerance of  $F_F$  35 and  $F_L$  25 and minimum local tolerance of  $F_F$  25 and  $F_L$  17 for exposed slabs and other finishes. Grind smooth surface defects that would telegraph through applied floor-covering system. Exposed surfaces are to be overtrowelled to "burn" surface to a dense, hard, dark finish.

1. Where test sample area includes multiple floor finishes, more stringent tolerances shall apply to entire test sample area.

C. Nonslip Broom Finish: Apply nonslip, heavy broom finish to exterior concrete slab surfaces. Immediately after trowel finishing, roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

D. Delay finishing as long as possible. Allow bleed water to evaporate before finishing.

E. Finish slabs to specified tolerances given. Patching low spots shall not be permitted. Perform grinding as soon as possible, preferably within 3 days, but not until concrete is sufficiently strong to prevent dislodging coarse aggregate particles.

### 3.9 COLD-WEATHER CONCRETING

A. Comply with Section 033000.

B. Provide temporary heat with vented heaters only.

C. Use foggers to maintain humidity at 50 percent minimum.

### 3.10 HOT-WEATHER CONCRETING

A. Comply with Section 033000.

### 3.11 CURING AND PROTECTION

A. Protect freshly placed slabs from premature drying and excessive cold or hot temperature. Maintain without drying at a relatively constant temperature for time period necessary for cement hydration and proper hardening.

B. Cure exterior slabs completely by moist-curing using burlap absorptive cover, soaker hoses, and ponding for at least 7 days. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers. Avoid rapid drying at end of curing period. Allow absorptive cover to remain an additional 3 days.

- C. Cure interior slabs by sheet-curing by covering slabs with curing sheet material for 7 days minimum. Avoiding rapid drying at end of curing period. Place curing cover in widest practicable width with sides and ends lapped at least 3 inches and sealed with waterproof tape or adhesive. Immediately repair holes or tears in cover during curing period.
- D. Do not allow foot or other traffic over slabs during 7-day curing period.
- E. Cure slabs or pads 14 days minimum before placing equipment.
- F. Interior Nonexposed Slabs:
  - 1. Place finish toppings, coatings, tile, and other materials to be bonded to slabs when the following have been satisfied:
    - a. Slabs have cured minimum of 90 days.
    - b. Acceptable moisture vapor emission and alkalinity test results have been achieved.
    - c. Acceptable 72-hour Bond Test results have been achieved. Bond test by floor finish installer.
- G. Interior Exposed Slabs:
  - 1. Apply two coats of hardener after slabs have cured 28 days minimum at rate of 100 square feet/gallon in accordance with manufacturer's recommendations.
- H. Exterior Slabs:
  - 1. Apply penetrating exterior anti-spalling sealer to exterior concrete slabs, walks, platforms, steps, ramps, and curbs according to manufacturer's directions.

### 3.12 JOINT SEALANT

- A. Install joint sealant in exposed construction, isolation, and contraction joints in accordance with manufacturer's recommendations.
- B. Clean joints thoroughly before applying sealant.
- C. Apply sealant after slabs have cured 90 days minimum.

### 3.13 REPAIR OF SURFACES

- A. Contractor shall be responsible for cost of repairing slab defects.
- B. Test surfaces for smoothness and level tolerances. Test uniform surfaces sloped to drain for trueness of slope.

- C. Correct flatness and levelness defects by grinding or removing and replacing slab. Patching low spots not permitted. Repair areas shall be remeasured and accepted by Owner.
- D. Repair cracks only when slab is more than 90 days old. Use crack repair material. For cracks over 1/8 inch, fill crack with oven-dried sand prior to application of crack repair material as recommended by manufacturer. Contractor has option to remove and rebuild areas of cracking. Mask cracks to limit crack repair material to crack only.
- E. Repair curling only when slab is more than 90 days old.
- F. Curling at slab edges exceeding 1/8 inch when measured with a 10-foot straightedge shall be made level by grinding or planing. Locate straightedge with its end at the slab edge, and measure space between straightedge and slab.
- G. If curling exceeds 1/4 inch, level slab by grinding or planing as stated above. In addition, core-drill slab 10 inches from joint at 2 foot intervals, alternating on each side of joint, and inject nonshrink grout to fill void beneath slab.
- H. Repair edge spalls occurring from shrinkage cracking or from Contractor's operations with methods acceptable to Engineer.

**END OF SECTION 03 3020**

**SECTION 03 4500**  
**PRECAST ARCHITECTURAL CONCRETE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Architectural precast concrete column plinths.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1323 - Heavy Timber Construction
- B. Section 07 9005 - Joint Sealers: Perimeter joints with sealant and backing.

**1.03 REFERENCE STANDARDS**

- A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- D. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2007a (Reapproved 2014).
- E. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts [Metric]; 2007.
- F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- G. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009.
- H. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- I. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2013.
- J. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.
- K. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- L. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.
- M. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars; 2001 (Reapproved 2007).
- N. IAS AC157 - Accreditation Criteria for Fabricator Inspection Programs for Reinforced and Precast/Prestressed Concrete; 2010.
- O. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products; Precast/Prestressed Concrete Institute; 2007.
- P. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute; Seventh Edition, 2010.
- Q. PCI MNL-122 - Architectural Precast Concrete; Precast/Prestressed Concrete Institute; 2007, Third Edition.
- R. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute; 1988, Second Edition.
- S. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction; Precast/Prestressed Concrete Institute; 2000.

**1.04 SUBMITTALS**

- A. Product Data: Manufacturer's information on accessory products, including pigments, admixtures, inserts, plates, etc.

- B. Shop Drawings: Indicate layout, unit locations, configuration, unit identification marks, reinforcement, connection details, support items, dimensions, and relationship to adjacent materials.
  - 1. Include details of mix designs.
  - 2. Include structural design calculations.
- C. Fabricator's Qualification Statement: Provide documentation showing precast concrete fabricator is accredited under IAS AC157.

### **1.05 QUALITY ASSURANCE**

- A. Fabricator Qualifications:
  - 1. Firm having at least 2 years of documented experience in production of precast concrete of the type required.
  - 2. Fabricator Qualifications: Precast concrete fabricator accredited by IAS according to IAS AC157.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect units to prevent staining, chipping, or spalling of concrete.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Architectural Precast Concrete:
  - 1. Any manufacturer holding a PCI Group A Plant Certification for the types of products specified; see [www.pci.org](http://www.pci.org).

### **2.02 PRECAST UNITS**

- A. Precast Architectural Concrete Units: Comply with PCI MNL-120, PCI MNL-122, PCI MNL-123, PCI MNL-135, and ACI 318.
  - 1. Design Loads: Static loads, anticipated dynamic loading, including positive and negative wind loads, thermal movement loads, and erection forces as defined by applicable code.
  - 2. Calculate structural properties of units in accordance with ACI 318.
  - 3. Accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
  - 4. Provide connections that accommodate building movement and thermal movement and adjust to misalignment of structure without unit distortion or damage.
- B. Finish Type A: Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance.

### **2.03 REINFORCEMENT**

- A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi).
  - 1. Deformed billet-steel bars.
  - 2. Galvanized in accordance with ASTM A767/A767M, Class I.
- B. Steel Welded Wire Reinforcement (WWR): Plain type, ASTM A1064/A1064M.

### **2.04 CONCRETE MATERIALS**

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
- B. Fine and Coarse Structural Aggregates: ASTM C33.
- C. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.
  - 1. Concentration: Base dosage rates on weight of Portland cement, fly ash, silica fume, and other cementitious materials but not aggregate or sand.
  - 2. Color(s): As selected by Owner's Representative from manufacturer's full range.
- D. Water: Clean and not detrimental to concrete.
- E. Fiber Reinforcement: Synthetic fiber shown to be resistant to long-term deterioration when exposed to moisture and alkalis; 1/2 inch length.

## **2.05 SUPPORT DEVICES**

- A. Connecting and Support Devices; Anchors and Inserts: ASTM A36/A36M steel; hot-dip galvanized in accordance with ASTM A153/A153M.
  - 1. Clean surfaces of rust, scale, grease, and foreign matter.
- B. Bolts, Nuts, and Washers: ASTM A307 heavy hex bolts, Type A, hot-dip galvanized, with matching ASTM A563 (A563M) nuts and matching washers.
- C. Primer: Zinc rich type.

## **2.06 ACCESSORIES**

- A. Bearing Pads: High density plastic; Shore A Durometer.; 1/2 inch thick, smooth both sides. Black in color.

## **2.07 FABRICATION**

- A. Fabricate in conformance with PCI MNL-117 and PCI MNL-135.
- B. Fabricate and handle epoxy-coated reinforcing bars in accordance with ASTM D3963/D3963M.
- C. Use rigid molds, constructed to maintain precast unit uniform in shape, size, and finish.
- D. Use form liners in accordance with manufacturer's instructions.
- E. Maintain consistent quality during manufacture.
- F. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items.
- G. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

## **2.08 FABRICATION TOLERANCES**

- A. Conform to PCI MNL-117 and PCI MNL-135.

## **PART 3 EXECUTION**

### **3.01 ERECTION**

- A. Erect units without damage to shape or finish. Replace or repair damaged panels.
- B. Erect units level and plumb within allowable tolerances.
- C. Align and maintain uniform horizontal and vertical joints as erection progresses.
- D. Fasten units in place with mechanical connections.
- E. Set vertical units dry, without grout, attaining joint dimension with lead or plastic spacers. Pack grout to base of unit.
- F. Exposed Joint Dimension: 1/2 inch. Adjust units so that joint dimensions are within tolerances.
- G. Seal perimeter and intermediate joints in accordance with Section 07 9005.

### **3.02 TOLERANCES**

- A. Erect members level and plumb within allowable tolerances. Conform to PCI MNL-135 .

**END OF SECTION**

**SECTION 04 4313**  
**BUILDING STONE VENEER**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Stone veneer of exterior walls

**1.02 RELATED SECTIONS**

- A. Section 03 3000 - Cast in-Place Concrete
- B. Section 07 90 00 - Joint Sealers (Joint Protection): Sealant and joint filler for perimeter and control joints.

**1.03 REFERENCES**

- A. ASTM C91 - Standard Specification for Masonry Cement.
- B. ASTM C144 – Standard Specification for Aggregate Masonry Mortar.
- C. ASTM C150 - Standard Specification for Portland Cement.
- D. ASTM C207 - Standard Specification for Hydrated Lime for Masonry
- E. Purposes.
- F. ASTM C270 - 08a Standard Specification for Mortar for Unit Masonry.
- G. ASTM C979 - 05 Standard Specification for Pigments for Integrally Colored Concrete.
- H. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- I. ACI-530.1-95/ ASCE 6-95/TMS 602-95 -The Specification for Masonry Structures.
- J. ANSI A118.4 Latex Portland Cement Mortar

**1.04 SUBMITTALS**

- A. Product Data:
  - 1. Stone properties data.
  - 2. Preparation instructions and recommendations.
  - 3. Storage and handling requirements and recommendations.
  - 4. Installation methods.
- B. Selection Samples: Submit mortar color samples.
- C. Verification Samples: Submit 2 manufacturer's samples of natural veneer stone for each pattern specified.

**1.05 QUALITY ASSURANCE**

- A. Stone Producer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Stone Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience.

**1.06 MOCK-UPS**

- A. Provide mock-up of each type/style/finish/size/color of adhered masonry veneer along with respective installation adhesives, mortars, pointing mortars, membranes and other installation materials.
  - 1. Construct areas designated by Owner's Representative.
  - 2. Do not proceed with remaining work until material, details and workmanship are approved by Owner's Representative.
  - 3. Refinish mock-up area as required to produce acceptable work.
  - 4. As approved by Owner's Representative, mock-up may be incorporated into finished work.



## **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Store stone on pallets. Pallet shall be shrink-wrapped (only if required and requested by owner), banded wood crates.
- B. Acceptance at Site: deliver and store packaged materials in original containers with seals unbroken and labels, including grade seal, intact until time of use, in accordance with manufacturer's instructions.
- C. Store installation system materials in a dry location; handle in a manner to prevent chipping, breakage, and contamination.
- D. Protect latex additives, organic adhesives, epoxy adhesives and sealants from freezing or overheating in accordance with manufacturer's instructions; store at room temperature when possible.
- E. Store Portland cement mortars in a dry location.

## **1.08 PROJECT CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install natural stone veneer under environmental conditions outside manufacturer's limits.
- B. Hot and Cold Weather Requirements: ACI 530.1/ASCE 6/TMS 602.
- C. Air Temperature: 40 degrees F or above during installation.
- D. Mortar Mixing Water: Heat mortar mixing water when air temperature falls below 50 degrees

## **PART 2 PRODUCTS**

### **2.01 NATURAL VENEER STONE**

- A. **MANUFACTURERS**
  - 1. Champlain Stone, [www.champlainstone.com](http://www.champlainstone.com)
  - 2. Eldorado Stone, [www.eldoradostone.com](http://www.eldoradostone.com)
  - 3. Adirondack Natural Stone, [www.adirondacknaturalstone.com](http://www.adirondacknaturalstone.com)
  - 4. Or approved equal.
- B. Adhered Thin Veneer – 3/4" inch thick – 1 1/4" thick (+/- 1/2"), non-load bearing.
  - 1. Lightweight (+/- 15 lbs per square foot), natural stone, thin sawn does not require a supporting masonry shelf (but recommended). Used for exterior applications at foundation walls:
    - a. Basis of Design: 1763 Granite Ashlar/ Split Face Thin Veneer – A Medium to course grain, weathered granite featuring shades of browns and ambers with hints of blush, blue-gray hues
      - 1) Primarily split faces
      - 2) Thickness: 0.75 inch – 1.25 inch thick (+/- 1/2 inch)
      - 3) Flats: Face Areas
        - (a) 3.0 Inch – 12 inch height (+/-)
        - (b) 6.0 inch – 20 inch Length (+/-)
      - 4) Pre-Cut Corner Pieces - Face Areas
        - (a) 0.33 sf – 0.75 sf

### **2.02 VENEER INSTALLATION MATERIALS**

- A. **MANUFACTURERS**
  - 1. LATICRETE International, Inc., 1 Laticrete Park North, Bethany, CT 06524-3423 USA  
Phone 800-243-4788, (203) 393-0010, <http://www.laticrete.com/mvis>
  - 2. Or approved equal
- B. Air Barrier and Waterproofing Membrane: LATICRETE® Air & Water Barrierto be thin, cold applied, single component liquid and load bearing. Waterproof membrane to be non-toxic, non-flammable, and non-hazardous during storage, mixing , application and when cured:
  - 1. Air Barrier Test (AC 212): Pass

2. Air Permeance (ASTM E2178): Pass
  3. Elongation @ break (ASTM D751): 2030%
  4. 7 day Tensile Strength (ANSI A118.10): >265 psi (1.8 MPa)
  5. 7 day Shear Bond Strength (ANSI A118.10): >200 psi (1.4 MPa)
  6. 28 Day Shear Bond Strength (ANSI A118.4): >214 psi (1.48 – 2.4 MPa)
  7. Service Rating (TCA/ASTM C627): Extra Heavy
  8. Total VOC Content: < 0.05 mg/m<sup>3</sup>
- C. Epoxy Flashing Mortar: LATAPOXY® Waterproof Flashing Mortar to be 3 component epoxy, trowel applied specifically designed for use under adhered masonry veneer.
1. Breaking Strength (ANSI A118.10): 450-530 psi (31.-3.6 MPa)
  2. Waterproofness (ANSI A118.10): No Water penetration
  3. 7 day Shear Bond Strength (ANSI A118.10): 110-150 psi (0.8-1 MPa)
  4. 28 Day Shear Bond Strength (ANSI A118.10): 90-120 psi (0.6-0.833 MPa)
  5. 12 Week Shear Bond Strength (ANSI A118.10): 110-130 psi (0.8-0.9 MPa)
  6. Total VOC Content: <3.4 g/L
- D. Cementitious backer board units: 1/2" thick. Installation and attachment as specified by cement backer board manufacturer, complying with ANSI A118.9.
- E. Latex/Portland Cement Mortar for leveling beds and scratch/plaster coats: LATICRETE MVIS Premium Mortar Bed to meet the following physical requirements:
1. Compressive Strength (ANSI A118.4 Modified): >4000 psi (27.6 MPa)
  2. Water Absorption (ANSI A118.6): 5%
  3. Service Rating (TCA/ASTM C627): Extra Heavy
  4. Smoke & Flame Contribution (ASTM
- F. Latex Portland Cement Pointing Mortar / Grout: MVIS Pointing Mortar \*\* to be weather, frost and shock resistant, as well as meet the following physical requirements:
1. Compressive Strength (ASTM C91): 3500 psi (24.1 MPa)
  2. Smoke & Flame Contribution (ASTM E84 Modified): 0
  3. Total VOC Content: < 0.00 mg/m<sup>3</sup>
- G. Expansion and Control Joint Sealant: MVIS Silicone Sealant to be a one component, neutral cure, exterior grade silicone sealant and meet the following requirements:
1. Tensile Strength (ASTM C794): 280 psi (1.9 MPa)
  2. Hardness (ASTM D751: Shore A): 25 (colored sealant) /15 (clear sealant)
  3. Weather Resistance (QUV Weatherometer): 10000 hours (no change)
- H. Spot Bonding Epoxy Adhesive: LATAPOXY 310 Stone Adhesive (Standard or Rapid Grade) for installing adhered masonry veneer, brick and stone over vertical and overhead surfaces shall be high strength, high temperature resistant, nonsag and shall meet the following physical requirements:
1. Thermal Shock Resistance (ANSI A118.3): >1000 psi (6.9 MPa)
  2. Water Absorption (ANSI A118.3): 0.1 %
  3. Compressive Strength (ANSI A118.3): >8300 psi (57.2 MPa)
  4. Shear Bond Strength (ANSI A118.3 Modified): >730 psi (5 MPa)

## **2.03 ACCESSORIES**

- A. Setting buttons or shims: Lead or plastic.
- B. Building Paper: ASTM D226, No. 30 asphalt saturated felt.
- C. Joint Sealants and Joint Fillers: As specified in Section 07 90 00.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin installation until backing structure is plumb, bearing surfaces are level and substrates are clean and properly prepared.

- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### **3.03 DIRECT ADHERE METHOD TO INSTALL MASONRY VENEER:**

- A. Install latex portland cement mortar in compliance with current revisions of ANSI A108.02 (3.11), A108.1B and ANSI A108.5. Use the appropriate trowel notch size to ensure proper bedding of the adhered masonry veneer, selected so that 100% coverage of the back surface of the Thin Adhered Veneer is achieved. Work the latex portland cement mortar into good contact with the substrate and comb with notched side of trowel. Spread only as much latex portland cement mortar as can be covered while the mortar surface is still wet and tacky. When installing large format (>8" x 8"/200mm x 200mm) units, spread latex portland cement mortar onto the back of (i.e. 'backbutter') each piece/unit in addition to troweling latex portland cement mortar over the substrate. Beat each piece/unit into the latex portland cement mortar with a beating block or rubber mallet to insure 100% full bedding and flatness. Allow installation to set until firm. Clean excess latex Portland cement mortar from adhered masonry veneer face and joints between pieces.
  - 1. Pattern Bond:
    - a. Layout work in advance and distribute color range of stone uniformly over total work area.
    - b. Lay stone with face exposed.
    - c. Take care to avoid concentration of any one color to any one wall surface.
    - d. Maintain uniform joints, as stone allows.
    - e. Do not use stacked vertical joints.

### **3.04 POINTING/GROUTING JOINTS**

- A. Polymer Fortified Pointing Mortar for joint widths  $\geq 1/16"$  (1.5mm) and  $\leq 3/4"$  (25mm)]; Allow Thin Adhered veneer to cure a minimum of 24 hours @ 70° F (21 °C). Verify joints are free of dirt, debris, wedges or spacers. Sponge or wipe dust/dirt off veneer face and remove any water standing in joints. Surface temperature must be between 40-90° F (43-32° C). Pour approximately 4 quarts (3.8 L) of clean, potable water into a clean mixing container. Add a 50 lb. (22.7 kg) bag of LATICRETE Pointing Mortar to the container while mixing. Mix by hand or with a slow speed mixer to a smooth, stiff consistency. Install latex fortified cement grout/pointing mortar in compliance with current revisions of ANSI A108.1A (7.0), ANSI A108.02 (4.5) and ANSI A108.10. Dampen dry surfaces with clean water.
- B. Place LATICRETE MVIS Pointing Mortar into a high quality masonry mortar pointing bag. Carefully bag the pointing mortar into the joints. Once the mortar has become stiff in the joint, ("thumbprint dry") typically 1520 minutes after pointing @ 70° F (21 °C), using a striking or joint tool, strike the mortar joints to the desired finish/contour. Remove excess mortar using a masonry brush or sponge. Do not over wash the mortar joint.
- C. Higher temperatures may require faster time to initial cleaning; wider joints or lower temperatures may require a longer time to initial cleaning. Allow joints to become firm. Inspect joint for pinholes/voids and repair them with freshly mixed grout/pointing mortar. Within 24 hours, check for remaining haze and remove it with warm soapy water and a nylon scrubbing pad, using a circular motion, to lightly scrub surfaces and dissolve haze/film. Do not use acid cleaners on latex portland cement grout/pointing mortar less than 10 days old.

### **3.05 EXPANSION AND CONTROL JOINTS:**

- A. Provide control or expansion joints as located in contract drawings and in full conformity, especially in width and depth, with architectural details.
  - 1. Substrate joints must carry through, full width, to surface of adhered masonry veneer.

2. Install expansion joints in adhered masonry veneer work over construction/cold joints or control joints in substrates.
  3. Install expansion joints where adhered masonry veneer abut restraining surfaces (such as perimeter walls, curbs, columns), changes in plane and corners.
  4. Joint width and spacing depends on application and should be determined by the project Owner's Representative.
  5. Joint width:  $\geq 1/8"$  (3mm) and  $\leq 3/4"$  (25mm).
  6. Joint width: depth ~2:1 but joint depth must be  $\geq 1/8"$  (3mm) and  $\leq 1/2"$  (12mm).
- B. Layout (field defined by joints): 1:1 length: width is optimum but must be  $\leq 2:1$ . Remove all contaminants and foreign material from joint spaces/surfaces, such as dirt, dust, oil, water, frost, setting/pointing materials, sealers and old sealant/backer. Use LATICRETE Latasil™ 9118 Primer for underwater and permanent wet area applications, or for porous stone (e.g. limestone, sandstone, ect.) installations. Install appropriate backing material (e.g. closed cell backer rod) based on expansion joint design and as specified. Apply masking tape to face of adhered masonry veneer, brick or stone veneer. Use caulking gun, or other applicator, to completely fill joints with sealant. Within 5-10 minutes of filling joint, 'tool' sealant surface to a smooth finish. Remove masking tape immediately after tooling joint. Wipe smears or excess sealant off the face of adhered masonry veneer or other absorptive surfaces immediately.
- C. Adjusting: Correction of defective work for a period of one (1) year following substantial completion, return to job and correct all defective work. Defective work includes, without limitation, adhered masonry veneer units stones broken in normal abuse due to deficiencies in setting bed, loose grout/pointing mortar, and all other defects which may develop as a result of poor workmanship.
1. Control and Expansion Joints:
    - a. Keep joints open and free of debris.
    - b. Coordinate control joints as specified above for sealant performance.
  2. Sealant Recesses:
    - a. Provide open joints 3/4 inch deep and 1/4 inch wide, where masonry meets doors, windows, and other exterior openings.
    - b. Coordinate sealant joints as specified above for sealant performance.
  3. Cutting and Fitting:
    - a. Cut and fit thin veneer stone for chases, pipes, conduit, sleeves, grounds, and other penetrations and adjacent materials.
    - b. Coordinate with other work to provide correct size, shape, and location.
  4. During progress of the work, cover top of unfinished stone masonry work for protection from weather.

### **3.06 CLEANING**

- A. Keep face of stone free of mortar as work progresses.
- B. If residual mortar is on face of stone, allow to dry partially and brush mortar off surface and sponge off residue.
- C. When work is completed and mortar has set for 2 to 3 days, clean surface from top to bottom using mild masonry detergent acceptable to natural stone manufacturer.
- D. Do not use harsh cleaning materials or methods that could damage stone.
- E. Do not use metal brushes or acids for cleaning.

### **3.07 PROTECTION**

- A. Protect installed natural stone veneer to ensure that, except for normal weathering, stone will be without damage or deterioration at time of Substantial Completion.
- B. Touch-up, repair, or replace damaged stone before Substantial Completion.

**END OF SECTION**

**SECTION 06 1000**  
**ROUGH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Structural dimension lumber framing - at stairs
- B. Non-structural dimension lumber framing.
- C. Rough opening framing for doors, windows, and roof openings.
- D. Roof and floor sheathing.
- E. Roofing nailers.
- F. Preservative treated wood materials.
- G. Miscellaneous framing and sheathing.
- H. Communications and electrical room mounting boards.
- I. Concealed wood blocking, nailers, and supports.
- J. Miscellaneous wood nailers, furring, and grounds.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete: Setting anchors in concrete.
- B. Section 06 1219 - Structural Insulated Panels.
- C. Section 06 1324 - Heavy Timber Framing.
- D. Section 06 1500 - Wood Decking.
- E. Section 07 2200 - Ventilated Nailbase Insulation Panels
- F. Section 07 3113 - Asphalt Shingles
- G. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

**1.03 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood Protection Association; 2012.
- D. PS 1 - Structural Plywood; 2009.
- E. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; National Institute of Standards and Technology, U.S. Department of Commerce; 2010.
- F. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology, Department of Commerce; 2010.
- G. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17; West Coast Lumber Inspection Bureau; 2004, and supplements.

**1.04 SUBMITTALS**

- A. Product Data: Provide technical data on each type of wood product. Include wood preservative materials and application instructions.
- B. Samples: For rough carpentry members that will be exposed to view, submit two samples, 6 by 12 inch in size illustrating wood grain, color, and general appearance
- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

## **PART 2 PRODUCTS**

### **2.01 GENERAL REQUIREMENTS**

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. Species: Spruce - Pine - Fir No. 1 / 2, unless otherwise indicated.
  - 2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
  - 3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee ([www.alsc.org](http://www.alsc.org)) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
  - 4. Lumber of other species or grades might be acceptable provided structural and appearance characteristics are equivalent to or better than products specified. Submit substitution per procedure outlined in specifications.
- B. Lumber fabricated from old growth timber is not permitted.

### **2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS**

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Stud Framing (2 by 2 through 2 by 6 ):
  - 1. Species: Spruce - Pine - Fir .
  - 2. Grade: No. 2.
- D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  - 1. Lumber: S4S, No. 2 or Standard Grade.
  - 2. Boards: Standard or No. 3.

### **2.03 EXPOSED DIMENSION LUMBER**

- A. Sizes: Nominal sizes as indicated on drawings.
- B. Surfacing: S4S.
- C. Moisture Content: S-dry or MC19.
- D. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 ), at stairs and other exposed locations:
  - 1. Species: Hem-Fir.
  - 2. Grade: Select.

### **2.04 CONSTRUCTION PANELS**

- A. Floor sheathing, For upper level restrooms and entry room: type ACX plywood sheathing. Refer to drawings for thickness.
- B. Roof Sheathing: Oriented strand board wood structural panel; PS 2.
  - 1. Grade: Structural 1 Sheathing.
  - 2. Bond Classification: Exposure 1.
  - 3. Performance Category: 5/8 PERF CAT.
  - 4. Span Rating: 40/20.
  - 5. Edges: Square.
  - 6. Exposure Time: Sheathing will not delaminate or require sanding due to moisture absorption from exposure to weather for up to 500 days.

- C. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

## **2.05 ACCESSORIES**

- A. Fasteners, Joist hangers, and Anchors:
  - 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, painted steel elsewhere.
- B. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.
- C. Subfloor Glue: Waterproof, air cure type, cartridge dispensed.

## **2.06 FACTORY WOOD TREATMENT**

- A. Treated Lumber and Plywood: Comply with requirements of AWP A U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
  - 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWP A standards.
- B. Preservative Treatment:
  - 1. Preservative Pressure Treatment of Lumber Above Grade: AWP A U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
    - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    - b. Treat lumber exposed to weather.
    - c. Treat lumber in contact with roofing, flashing, or waterproofing.
    - d. Treat lumber in contact with masonry or concrete.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- B. Coordinate installation of rough carpentry members specified in other sections.

### **3.02 INSTALLATION - GENERAL**

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

### **3.03 FRAMING INSTALLATION**

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AFPA Wood Frame Construction Manual.
- E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

### **3.04 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

### **3.05 ROOF-RELATED CARPENTRY**

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

### **3.06 INSTALLATION OF CONSTRUCTION PANELS**

- A. Subflooring: Glue and nail to framing; staples are not permitted.
- B. Roof and Floor Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
  - 1. Nail panels to framing; staples are not permitted.
- C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
  - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
  - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
  - 3. Install adjacent boards without gaps.

### **3.07 TOLERANCES**

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

### **3.08 CLEANING**

- A. Waste Disposal:
  - 1. Comply with applicable regulations.
  - 2. Do not burn scrap on project site.
  - 3. Do not burn scraps that have been pressure treated.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

**END OF SECTION**



**SECTION 06 1219**  
**STRUCTURAL INSULATED PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Structural insulated panels for walls.
- B. Fasteners and adhesives.
- C. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1324 - Heavy Timber Framing
- B. Section 06 1000 - Rough Carpentry: Bearing support, stud framing, miscellaneous blocking and nailers.
- C. Section 07 4623 - Wood Siding

**1.03 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- D. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- E. ASTM D1622/D1622M - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2014.
- F. ASTM D2559 - Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions; 2012a.
- G. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples; 2013.
- H. ICC-ES AC04 - Acceptance Criteria for Sandwich Panels; 2010.
- I. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; National Institute of Standards and Technology, U.S. Department of Commerce; 2010.

**1.04 SUBMITTALS**

- A. Product Data: Provide structural insulated panel manufacturer's product literature including structural properties, design load capacities and installation instructions.
- B. Current code report/material listing report: Showing evidence of compliance with code requirements from an International Accreditation Service (IAS) Accredited Product Certification Agency. The report shall include all load cases for transverse, axial, and racking shear loads for the SIPs. The report must demonstrate that the SIPs may be used as shear walls in Seismic Design Category A, B, or C.
- C. Shop Drawings: Fully dimensioned fabrication and installation details for structural insulated panels.
  - 1. Indicate dimensions, materials, connections and arrangement of joints.
  - 2. Include anchorage, size and type of fasteners, and accessories.
  - 3. Include locations of custom wire chases for electrical work. Coordinate with electrical drawings.
  - 4. Include calculations that indicate compliance with the applicable building code and the structural insulated panel manufacturer's requirements.
  - 5. Include seal of Professional Engineer registered in the State in which the Project is located on drawings and calculations.

6. Include selections from prescriptive design tables that indicate compliance with the applicable building code and the structural insulated panel manufacturer's requirements.
  7. Clearly indicate the load and capacity assumptions selected. Include copies of any calculations.
- D. Designer's Qualification Statement.
  - E. Manufacturer's Qualification Statement.
  - F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's Representative's name and registered with manufacturer.

#### **1.05 SPECIAL INSPECTIONS**

- A. Refer to Section 01 4533 and Schedule of Special Inspections.
- B. At completion of fabrication, Manufacturer shall submit a Certificate of Compliance to the Special Inspector and to the Code Enforcement Official stating that the work was performed in accordance with the approved Shop Drawings.

#### **1.06 QUALITY ASSURANCE**

- A. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
  1. Member of Structural Insulated Panel Association (SIPA).
- C. Installer Qualifications: Installer shall be experienced in performing the work of this section, with not less than five (5) documented projects of similar scope to that required for this project.
- D. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver structural insulated panels in manufacturer's packaging, if any, and with manufacturer labels and markings intact.
- B. Cover structural insulated panels with waterproof covering during transportation and storage. Keep dry.
- C. Protect edges of wood construction panels and foam cores.
- D. Fully support structural insulated panels off the ground.
- E. Do not lift structural insulated panels by wood construction panel layer.

#### **1.08 WARRANTY**

- A. Correct defective Work within a five year period after Date of Substantial Completion.
- B. Provide twenty year manufacturer warranty on structural insulated panel material and workmanship.

### **PART 2 PRODUCTS**

#### **2.01 STRUCTURAL INSULATED PANELS**

- A. Structural Insulated Panels: Provide structural insulated panels capable of withstanding design loads including dead load, live load, wind load and seismic load.
- B. Structural Insulated Wall Panel: Oriented strand board construction panel laminated to both sides of rigid expanded polystyrene insulation board.
  1. Panel Size: 4 feet by 8 feet min.
  2. Overall Thickness: 6-1/2 inches.
  3. Span Rating: 24/16, minimum.
  4. Edge Treatment: Square edge.

## **2.02 MATERIALS**

- A. Oriented Strand Board: 7/16 inch thick, APA Exposure 1, DOC PS-2 span rating 24/16, minimum.
- B. Expanded Polystyrene (EPS) Insulation Board:
  - 1. Density: ASTM C578, Type I; 0.9 lb/cu ft, minimum, when tested according to ASTM D1622/D1622M.
  - 2. Thermal Resistance: R-value of 3.6 deg F hr sq ft/Btu, minimum, when tested at 1 inch thickness in accordance with ASTM C518 or ASTM C177.
- C. Laminating Adhesive: Manufacturer's standard; complying with ASTM D2559.
- D. Dimension Lumber:
  - 1. SPF #2 or better. Refer to Section 06 1000 Rough Carpentry
  - 2. Sizes: Nominal sizes as required for panel sizes, S4S.
  - 3. Moisture Content: S-dry or MC19.
- E. Weather Barrier Joint Tape: Manufacturer's standard; 6 inches wide.

## **2.03 ACCESSORIES**

- A. Fasteners and Anchors:
  - 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
  - 2. Heavy Duty Metal Screws: 1/8 inch to 1/4 inch diameter.
- B. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine foundations, sills, framing and other surfaces to receive structural insulated panels. Verify conditions suitable for installation. Report unsatisfactory conditions to Owner's Representative. Do not proceed with structural insulated panel work until unsatisfactory conditions corrected.

### **3.02 PREPARATION**

- A. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- B. Coordinate installation of rough carpentry members specified in other sections.
- C. Confirm proper locations of custom wire chases in wall panels.

### **3.03 INSTALLATION**

- A. Install structural insulated panels in accordance with manufacturer's instructions.
  - 1. Comply with manufacturer's written recommendation for number, size and placement of fasteners.
  - 2. Join structural insulated panel edges according to manufacturer's written recommendation.
- B. Restrictions:
  - 1. Do not over cut oriented strand board or plywood face when field-cutting openings.
  - 2. Do not field install electrical chases inside structural insulated panels. Electrical chases are to be factory installed in coordination with electrical drawings.
  - 3. Do not install plumbing inside structural insulated panels without consulting manufacturer and obtaining written recommendations.
  - 4. Protect structural insulated panel core from solvents and solvent vapors.
- C. Prevent damage to structural insulated panels. Cover panels to prevent contact with water on each exposed edge and face.
- D. When structural insulated panels have oriented strand board or plywood on one side only, install panel with wood face on exterior of structure.

- E. Install structural insulated panels plumb, square and true to line.
- F. Seal panel joints with manufacturer's recommended joint tape.
- G. Repair or replace damaged panels.

**END OF SECTION**

## **SECTION 06 1324**

### **HEAVY TIMBER FRAMING**

#### **PART 1 - GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.

##### **1.2 WORK INCLUDED**

- A. Work includes furnishing labor, materials, and equipment to furnish, and install structural and architectural timber framing as detailed in drawings or specified, including structural design of timber frame system, joinery, and connections not provided in drawings, and supplying associated fasteners to complete system and connect timber framing members to structural supports.
- B. Types of timber construction specified in this section include the following:
  - 1. Beams, girders, joists and purlins.
  - 2. Columns and posts.
  - 3. Timber trusses.

##### **1.3 RELATED WORK**

- A. The following sections are related to work of this section:
  - 1. Section 06100 Rough Carpentry.
  - 2. Section 06120 Structural Insulated Panels.
  - 3. Section 06200 Finish Carpentry.

##### **1.4 DEFINITIONS**

- A. Inspection Agencies and abbreviations used to reference them include the following:
  - 1. NELMA - Northeastern Lumber Manufacturers Association.
  - 2. NHLA - National Hardwood Lumber Association.
  - 3. NLGA - National Lumber Grades Authority.
  - 4. SPIB - Southern Pine Inspection Bureau.
  - 5. WCLIB - West Coast Lumber Inspection Bureau.
  - 6. WWPA - Western Wood Products Association.
  - 7. AWWPA – American Wood Protection Association

##### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Schedule timber delivery and installation to avoid extended on-site storage.
- B. Keep timber members dry during delivery and storage. Cover timber with weathertight tarps. Do not store members in areas of high or low relative humidity.

- C. Cut and stack timber so as not to encourage growth of sap-stain fungi, mold, carpenter ants, borers, etc.
- D. Stack timbers with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

## **1.6 SUBMITTALS**

- A. Shop Drawings: Submit for review shop drawings showing location of chamfers and other surfacing features. If alternate connection designs are proposed, submit drawings signed and sealed by a Structural Engineer registered in state where project is located. Provide hardware cut sheets and design values for fasteners.

## **1.7 QUALITY ASSURANCE**

- A. Fabricator and Erector of timber framing shall not have less than 10 years experience in fabrication and erection of timber framing.
- B. Timbers shall be graded by lumber grading agency certified by American Lumber Standards Committee or by a qualified timber frame engineer.
- C. Locate grade stamp on timber surfaces not exposed to view in completed work. Grade certification can be submitted in lieu of grade stamping material.
- D. For timbers with required material properties in excess of the maximum allowed by the grading agency, non-destructive data for each above-grade timber shall be provided to the timber frame specialty engineer of record.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. General: Comply with PS 20 and grading rules of lumber grading agencies certified by American Lumber Standards Committee Board of Review as applicable.
  - 1. Factory mark each item of timber with grade stamp of grading agency.
  - 2. For exposed timber indicated to receive stained or natural finish, apply grade stamps to surfaces not exposed to view, or omit grade stamps and provide certificates of grade compliance issued by grading agency.
  - 3. For timber for which there is no available grading agency submit a certificate of grade provided by the fabricator and reviewed by the timber frame specialty engineer of record.

### **2.2 TIMBER**

- A. Timber Species and Grade: #1 and #2 Eastern white pine and #1 and #2 white oak timber. Specification of grades as noted on the structural drawings supercede these specifications.
- B. Timber performance requirements. Species and grade that comply with required structural properties for moisture content provided.
  - 1. Allowable Stress Ratings for appropriate size classification, per NELMA.

- C. Grading Rules: NELMA
- D. For large (6" inch or greater maximum dimension) members, box heart timbers may be used. For small (less than 6" inch maximum dimension) members, free of heart center timbers shall be used. Do not use timber with excessive reaction, spiral grain or juvenile wood.
- E. Moisture Content: Provide timbers at or below 35% average moisture content as measured across their cross section.
- F. Dressing: Provide dressed timber (S4S) planed to the specified dimension unless otherwise indicated on the drawings. Dimensions noted on the drawings are actual sizes required consistent with PS20
- G. Incising: Incising of timbers is not permitted.
- H. End Sealer: Manufacturer's standard, transparent, colorless wood sealer effective in retarding transmission of moisture at white oak cross-grain cuts and compatible with finish. Basis of design: Heritage Natural Finishes < <http://www.heritagenaturalfinishes.com/> >
- I. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer compatible with finish.
  - 1. Basis of design: Heritage Natural Finishes. "Original Finish" at interior and "Exterior Finish" at exterior. < <http://www.heritagenaturalfinishes.com/> >
  - 2. 3 Coats minimum

## **2.3 PEGS**

- A. Use straight grain peg material with slope of grain not greater than 1:15, made of hard maple, walnut, ash or oak.
- B. Unless noted otherwise on the drawings, pegs shall be uniform in diameter, no more than 1/64" oversized, with chamfered edges on all visual ends.
- C. All pegs shall be 1" in diameter, unless otherwise noted on the drawings.

## **2.4 WEDGES**

- A. Use straight-grain wedge material with slope of grain not greater than 1:15. Wedge material shall be clear, straight grained hardwood.

## **2.5 FASTENERS**

- A. General: Provide fasteners of size and type complying with requirements specified for material and manufacture.
  - 1. Where fasteners are exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide Type 304 stainless steel.
- B. Wood Screws: ASME B18.6.1.
- C. Proprietary Fasteners:

Unless specifically called out by manufacturer name on the structural sheets, the term “log screw” shall refer to any of the following.

1. RSS structural screws by GRK or accepted equivalent.
2. Timberlok fasteners by FastenMaster or accepted equivalent.
3. WFC/WFR/WFD fasteners by SFS intec or accepted equivalent.
4. SK, EcoFast, Kombi, VG fasteners by ASSY or accepted equivalent.
5. HECO Topix screws or accepted equivalent
6. SPAX T-Star screws or accepted equivalent
7. Simpson SDS screws or accepted equivalent

The fabricator will inform the timber frame specialty engineer of record of the type of screws being used before work erection commences.

- D. Lag Bolts: ASME B18.2.1.
- E. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers. Bearing washers as indicated on the structural drawings.
- F. Threaded Rods: ASTM A 36.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing in accordance ASTM E 488, performed by a qualified independent testing and inspecting agency.
  - 1. Material: Carbon-steel components, zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
- H. Other proprietary connectors:
  - 1. Timberlinx steel connectors by Timberlinx, Division of Michael Preston Distributors Limited or accepted equivalent.
  - 2. Others as specified on drawings.

## **2.6 STEEL CONNECTION MATERIALS**

- A. Unless otherwise indicated, fabricate steel connection materials and steel elements from the following materials:
  - 1. Structural-steel shapes, plates, and flat bars complying with ASTM A 36.
  - 2. Round steel bars complying with ASTM A 575, Grade M 1020.
  - 3. Hot-rolled steel sheet complying with ASTM A 1011, Structural Steel, Type SS, Grade 33.
  - 4. Stainless steel plate and flat bars complying with ASTM A 666, Type 304.
  - 5. Stainless steel bars and shapes complying with ASTM A 276, Type 304.
  - 6. Stainless steel sheet complying with ASTM A 666, Type 304.
- B. Fabricate tie rods from round steel bars with upset threads connected with forged-steel turnbuckles complying with ASTM A 668/A 668M.
- C. Use shear plates complying with ASTM D 5933.
- D. Finish:



1. Where not exposed to weather, finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil dry film thickness.
2. Where exposed to weather and not otherwise called out as stainless steel, hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A 123/A 123M or ASTM A 153/A 153M.

## **2.7 FABRICATION**

- A. Site fabricate members by cutting and restoring exposed surfaces to match specified surfacing. Predrill for fasteners and assembly of units.
  1. Finish exposed surfaces to provide smooth finish unless noted otherwise on the drawings. Surface texture shall be equivalent to that produced by machine sanding with No. 120 grit sandpaper.
- B. Camber: Fabricate horizontal members and inclined members with slope of less than 1:1 with natural convex bow (crown) up to provide camber.
- C. Seal Coat: After fabricating and surfacing each unit, apply saturation coat of finish as determined from samples submitted to and approved by the Owner's Representative on surfaces of each unit except for treated wood where treatment included water repellent.
- D. Timber sizes are actual dimensions prior to shrinkage. Plane to square, uniform dimension at joinery locations. Tolerances for dressed dimensions shall as specified in PS20.
- E. Minimal waney edges are permitted. Solid, square edges on all exposed edges of timbers is required on 95% of material. Care should be taken to eliminate corner damage from banding, shipping, fork lifts, handling, and rigging.
- F. Timbers with moderate bow are permitted where their intended use will straighten them. Place crowns up for spanning members. Do not use severely bowed timbers or timbers bowed in more than one direction.
- G. Remove staining from soil, oil, or grease.
- H. All timbers will have handling chamfer not to exceed 1/8". Chamfer exposed edges of beams and posts at locations per architectural requirements. Fabricator to provide dimensioned locations of all chamfer locations on shop drawings for approval.
- I. Cut mortise and tenon joints so there is 1/4-inch-minimum clearance between tenon ends and mortise bottom to allow for shrinkage.
- J. Cut 1/4-inch chamfers on tenons on end grain edges.
- K. Cut joints accurately to make neat, snug fit.
- L. Drill peg holes to produce a tight fit at final assembly. When their location is not indicated in drawings, locate center line of hole 2 inches from face of mortise and 2" up from bottom of tenon.
- M. Draw boring of pegs shall not exceed 1/8".
- N. Layout marks and identification marks shall not be visible on completed frame.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION, GENERAL**

- A. General: Erect heavy timber construction true and plumb. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.
- B. Handle and temporarily support heavy timber construction to prevent surface damage, compression, and other effects that might interfere with indicated finish. Tools used to drive or pull joints together shall not mar finished surface of timber.
- C. Framing adjacent to masonry: Provide 1/2-inch clearance at tops, sides, and ends of members adjacent to masonry unless otherwise indicated.
- D. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with finish and preservative treatment requirements for shop fabrication.
- E. Unless noted otherwise in the drawings, saw off pegs protruding on exterior of frame flush. Leave interior pegs protruding 1/2". Cut off pegs with mushroomed heads below damaged area.

### **3.2 STRUCTURAL TESTS AND INSPECTIONS**

- A. Notify Special Inspector when structural framing is complete. Timber framing shall be inspected and approved prior to enclosing walls, floors, roofs, or ceilings.

### **3.3 ADJUSTING AND CLEANING**

- A. Repair damaged surfaces and finishes after completing erection. Replace damaged heavy timber construction if repairs are not approved by Owner's Representative.

**END OF SECTION**

**SECTION 06 1500**  
**WOOD DECKING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Softwood lumber structural wood decking.
- B. Preservative treatment of wood.
- C. Accessories - membrane drainage system

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Bearing support.
- B. Section 09 9000 - Painting and Coating

**1.03 REFERENCE STANDARDS**

- A. AITC 112 - Standard for Tongue-and-Groove Heavy Timber Roof Decking; American Institute of Timber Construction; 1993, and errata.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood-Preservers' Association; 2012.
- D. NELMA (SGR) - Standard Grading Rules for Northeastern Lumber; Northeastern Lumber Manufacturers Association, Inc; 2013.
- E. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17; West Coast Lumber Inspection Bureau; 2004, and supplements.

**1.04 SUBMITTALS**

- A. Product Data: Provide technical data on wood preservative materials.
- B. Samples of Wood Deck Exposed To View: Submit two samples, 6 by 12 inch in size illustrating wood grain, stain, and finish.

**PART 2 PRODUCTS**

**2.01 WOOD MATERIALS**

- A. Wood fabricated from old growth timber is not permitted.
- B. Lumber Floor and Roof Decking: Fabricated to AITC 112.
  - 1. Species: hemlock, graded as AITC Select quality.
  - 2. Size: Varies, refer to drawings.
  - 3. Pattern: AITC standard beveled V-joint with single tongue and groove.
  - 4. Moisture Content: 19 percent, maximum.
- C. Exterior Porch Decking:
  - 1. Size: 5/4 x 6
  - 2. Pressure treated, see below.

**2.02 ACCESSORIES**

- A. Membrane drainage system under deck at back porch only
  - 1. Basis of design: DEC Drain TopSide ® Water Diversion System, <http://www.dekdrain.com/index.php>

**2.03 WOOD TREATMENT**

- A. Preservative Pressure Treatment, exterior decking only:
  - 1. Preservative Pressure Treatment of Lumber Decking: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
    - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that support framing is ready to receive decking.

### **3.02 INSTALLATION - TONGUE AND GROOVE FLOOR AND ROOF DECKING**

- A. Install decking perpendicular to framing members, with ends staggered over firm bearing. On sloped surfaces, lay decking with tongue upward.
- B. Engage decking tongue and groove edges.
- C. Secure with fasteners. Side spike planks together, through pre-drilled holes.

### **3.03 INSTALLATION - PORCH DECKING**

- A. Install decking perpendicular to framing members, with ends staggered over firm bearing.
- B. Maintain decking joint space of 1/16 inch maximum.

### **3.04 TOLERANCES**

- A. Surface Flatness of Decking Without Load: 1/4 inch in 10 feet maximum, and 1/2 inch in 30 feet maximum.

**END OF SECTION**

**SECTION 06 2000**  
**FINISH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Finish carpentry items, including custom lobby desk.
- B. Exterior soffits, trim boards, and handrails.
- C. Wood casings, moldings, stair treads and handrails.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 09 9000 - Painting and Coating

**1.03 REFERENCE STANDARDS**

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- B. AWWPA U1 - Use Category System: User Specification for Treated Wood; American Wood-Preservers' Association; 2012.
- C. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).
- D. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.
- E. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2010.
- F. WI (CCP) - Certified Compliance Program (CCP); current edition at [www.woodworkinstitute.com/certification](http://www.woodworkinstitute.com/certification).

**1.04 SUBMITTALS**

- A. Product Data:
  - 1. Provide data on fire retardant treatment materials and application instructions.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Provide the information required by AWI/AWMAC/WI (AWS).

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Protect work from moisture damage.

**PART 2 PRODUCTS**

**2.01 FINISH CARPENTRY ITEMS**

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI (AWS) for Premium Grade.
- B. Finish: Prepare surfaces for stain finish.
- C. Exterior Woodwork Items:
  - 1. Species: Unless otherwise indicated provide Red Cedar
  - 2. Refer to drawings for information on the following woodwork items:
    - a. Enclosing Soffit Spaces
    - b. Fascia, frieze board, window and door trim, and other exterior trim.
    - c. Guardrail cap, trim and handrail.
- D. Interior Woodwork Items:
  - 1. Species: To match hardwood floor
  - 2. Refer to drawings for information on the following woodwork items:
    - a. Base Molding and Door and Window Trim
    - b. Wall cap and trim

- c. Lobby desk
- d. Stair treads and handrails

## **2.02 WOOD-BASED COMPONENTS**

- A. Wood fabricated from old growth timber is not permitted.

## **2.03 LUMBER MATERIALS**

- A. Softwood Lumber: species listed above, Quarter sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

## **2.04 FASTENINGS**

- A. Fasteners: Of size and type to suit application; galvanized finish in concealed locations and stainless steel finish in exposed locations.
- B. Concealed Joint Fasteners: Threaded steel.

## **2.05 ACCESSORIES**

- A. Wood Filler: Solvent base, tinted to match surface finish color.

## **2.06 FABRICATION**

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

## **2.07 SHOP FINISHING**

- A. Apply wood filler in exposed nail and screw indentations.
- B. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- C. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified in Section 09 9000 Painting and Coating:
- D. Back prime woodwork items to be field finished, prior to installation.

# **PART 3 EXECUTION**

## **3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

## **3.02 INSTALLATION**

- A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

## **3.03 PREPARATION FOR SITE FINISHING**

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 9000.

## **3.04 TOLERANCES**

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

**END OF SECTION**

**SECTION 07 1400**  
**FLUID-APPLIED WATERPROOFING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fluid applied membrane waterproofing.
- B. Below-grade waterproofing accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete substrate.
- B. Section 07 9005 - Joint Sealers: Sealant for joints in substrates.

**1.03 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2006 (Reapproved 2011).
- C. ASTM C1306 - Standard Test Method for Hydrostatic Pressure Resistance of a Liquid-Applied Waterproofing Membrane; 2008.
- D. ASTM D2370 - Standard Test Method for Tensile Properties of Organic Coatings; 1998 (Reapproved 2010).
- E. ASTM E96/E96M - Standard Test Methods For Water Vapor Transmission of Materials; 2014.

**1.04 SUBMITTALS**

- A. Product Data: Provide data for membrane and accessories.
- B. Certificate: Certify that products meet or exceed specified requirements.
- C. Manufacturer's Installation Instructions: Indicate special procedures.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's Representative's name and registered with manufacturer.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacture of fluid-applied waterproofing membranes with three years experience.
- B. Installer Qualifications: Company specializing in installation of fluid-applied waterproofing with minimum 3 years experience.

**1.06 FIELD CONDITIONS**

- A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until cured.

**1.07 WARRANTY**

- A. Contractor shall correct defective Work within a five year period after Date of Substantial Completion; remove and replace materials concealing waterproofing at no cost to Owner's Representative.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Cold-Applied, Modified-Polymer Elastomeric Waterproofing Manufacturers:
  - 1. Carlisle Coatings & Waterproofing, Inc.: [www.carlisle-ccw.com](http://www.carlisle-ccw.com).
  - 2. Henry Company: [www.henry.com](http://www.henry.com).
  - 3. W.R. Meadows, Inc; HYDRALASTIC 836: [www.wrmeadows.com](http://www.wrmeadows.com).
  - 4. Or approved equal.

## **2.02 MEMBRANE AND FLASHING MATERIALS**

- A. Cold-Applied, Modified-Polymer Elastomeric Waterproofing:
  - 1. Cured Thickness: 55 mils (0.055 inches), minimum.
  - 2. Suitable for installation over concrete substrates.
  - 3. Tensile Strength: 95 psi, measured in accordance with ASTM D2370.
  - 4. Ultimate Elongation: 350 percent, minimum, measured in accordance with ASTM D2370.
  - 5. Hardness: 10, minimum, measured in accordance with ASTM C661, using Type A durometer.
  - 6. Water Vapor Permeability: 0.07 perm inch, maximum measured in accordance with ASTM E96/E96M.

## **2.03 ACCESSORIES**

- A. Protection Board: Type capable of preventing damage to waterproofing due to backfilling and construction traffic.
  - 1. Use one of the following:
    - a. Hardboard, 1/8 inch thick.
    - b. Asphalt impregnated wood fiberboard, 1/4 inch thick.
    - c. Polystyrene foam board, 1 inch thick.
- B. Drainage Panel: Drainage layer with geotextile filter fabric on earth side.
  - 1. Composition: Dimpled polyethylene or polypropylene core; polypropylene filter fabric.
    - a. Products:
      - 1) Advanced Building Products, Inc.; ABP AdvancedDrain: [www.advancedbuildingproducts.com](http://www.advancedbuildingproducts.com).
      - 2) Epro Services, Inc.; ECODRAIN-MS: [www.eproserv.com](http://www.eproserv.com).
      - 3) Mar-flex Waterproofing & Building Products; Geo-Mat Plus: [www.mar-flex.com](http://www.mar-flex.com).
      - 4) Or approved equal

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify substrate surfaces are free of frozen matter, dampness, loose particles, cracks, pits, projections, penetrations, or foreign matter detrimental to adhesion or application of waterproofing system.
- C. Verify that substrate surfaces are smooth, free of honeycomb or pitting, and not detrimental to full contact bond of waterproofing materials.
- D. Verify that items that penetrate surfaces to receive waterproofing are securely installed.

### **3.02 PREPARATION**

- A. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.
- B. Do not apply waterproofing to surfaces unacceptable to manufacturer.
- C. Seal cracks and joints with sealant using methods recommended by sealant manufacturer.

### **3.03 INSTALLATION**

- A. Apply waterproofing in accordance with manufacturer's instructions to specified minimum thickness.
- B. Apply primer or surface conditioner at a rate recommended by manufacturer. Protect conditioner from rain or frost until dry.
- C. At joints and cracks less than 1/2 inch in width including joints between horizontal and vertical surfaces, apply 12 inch wide strip of joint cover sheet.
- D. At joints from 1/2 to 1 inch in width, loop joint cover sheet down into joint between 1-1/4 and 1-3/4 inch. Extend sheet 6 inches on either side of expansion joint.



- E. Apply extra thickness of waterproofing material at corners, intersections, and angles.
- F. Seal membrane and flashings to adjoining surfaces. Install termination bar at all edges.

#### **3.04 INSTALLATION - PROTECTION BOARD**

- A. Place drainage panel directly against membrane, butt joints, place to encourage drainage downward. Scribe and cut boards around projections, penetrations, and interruptions.
- B. Place protection board directly against drainage panel; butt joints. Scribe and cut boards around projections, penetrations, and interruptions.
- C. Adhere protection board to substrate with compatible adhesive.

**END OF SECTION**

**SECTION 07 2100**  
**THERMAL INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Board insulation at perimeter foundation wall, underside of floor slabs, and exterior wall behind stone veneer wall finish.
- B. Batt insulation and vapor retarder in exterior wall construction.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete: Field-applied termiticide for concrete slabs and foundations.

**1.03 REFERENCE STANDARDS**

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
- D. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies; 2011.

**1.04 SUBMITTALS**

- A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- B. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

**PART 2 PRODUCTS**

**2.01 FOAM BOARD INSULATION MATERIALS**

- A. Extruded Polystyrene Board Insulation: Extruded polystyrene board; ASTM C578; with either natural skin or cut cell surfaces, and the following characteristics:
  - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
  - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
  - 3. R-value; 1 inch of material at 72 degrees F: 5, minimum.
  - 4. Manufacturers:
    - a. Dow Chemical Co: [www.dow.com](http://www.dow.com).
    - b. Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
    - c. Kingspan Insulation LLC; GreenGuard XPS TYPE IV 25 PSI: [www.trustgreenguard.com](http://www.trustgreenguard.com).

**2.02 BATT INSULATION MATERIALS**

- A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
  - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
  - 2. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
  - 3. Total thermal Resistance: R-value of 13 for 3 1/2" thickness.
  - 4. Facing: Aluminum foil, flame spread 25 rated; one side.

**2.03 ACCESSORIES**

- A. Tape joints of rigid insulation in accordance with insulation manufacturers' instructions.
- B. Insulation Fasteners: Appropriate for purpose intended.
  - 1. Length as required for thickness of insulation material and penetration of deck substrate, .
- C. Adhesive: Type recommended by insulation manufacturer for application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

### **3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER**

- A. Install boards horizontally on foundation perimeter.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

### **3.03 BOARD INSTALLATION AT EXTERIOR WALLS**

- A. Adhere a 6 inch wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
- B. Install boards horizontally on walls.
  - 1. Install in running bond pattern.
  - 2. Butt edges and ends tightly to adjacent boards and to protrusions.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- D. Place 6 inch wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames. Tape seal in place to ensure continuity of vapor retarder and air seal.
- E. Tape insulation board joints.

### **3.04 BOARD INSTALLATION UNDER CONCRETE SLABS**

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

### **3.05 BATT INSTALLATION**

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

### **3.06 PROTECTION**

- A. Do not permit installed insulation to be damaged prior to its concealment.

**END OF SECTION**

**SECTION 07 2200**  
**VENTILATED NAILBASE INSULATION PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Section includes ventilated nailbase insulation panel system at roof.
- B. Vapor barrier for roof

**1.02 RELATED SECTIONS**

- A. Section 06 1000 – Rough Carpentry
- B. Section 06 1500 – Wood Decking
- C. Section 07 3113 – Asphalt Shingles

**1.03 REFERENCES**

- A. ASTM C 209 – Methods of Testing Insulating Board, Structural and Decorative.
- B. ASTM C 1289 – Specifications for Faced Rigid Cellular Polyisocyanurate Thermal Insulating Board.
- C. ASTM D 1621 – Test Methods for Compressive Properties of Rigid Cellular Plastics.
- D. ASTM D 2126 - Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
- E. ASTM E 96 - Test Method for Water Vapor Transmission of Materials.
- F. UL 1256 - Fire Test of Roof Deck Constructions.
- G. PS2-92 - Performance Standard for Wood-based Structural-use Panels.

**1.04 SYSTEM DESCRIPTION**

- A. Physical properties (Foam Core):
  - 1. Compressive Strength: ASTM D 1621 and ASTM C 1289, Type II, 25 psi minimum for Grade 3.
  - 2. Dimensional Stability: ASTM D 2126, 2 percent linear change (7 days).
  - 3. Moisture Vapor Transmission: ASTM E 96, < 1 perm ((57.5ng/(Pa•s•m2))).
  - 4. Water Absorption: ASTM C 209, < 1 percent by volume.
  - 5. Service Temperature: -100 degrees to 250 degrees F (-73 degrees C to 122 degrees C).
- B. Foam Core R Values: Based on LTTR (Long Term Thermal Resistance) in accordance with ASTM C 1289.

**1.05 SUBMITTALS**

- A. Product Data: Manufacturer's data sheets on roof panels and fasteners to be used, including:
  - 1. Material properties.
  - 2. Preparation instructions and recommendations.
  - 3. Storage and handling requirements and recommendations.
  - 4. Installation methods.
- B. Verification Samples: For each finish product specified, two samples, representing actual product.
  - 1. Submit 12 by 12 inch (152 mm by 152 mm) samples of each board type required.
  - 2. Submit samples of each fastener type required.
- C. Manufacturer's Certificate: Certify panels will conform to specified performance requirements.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer shall be a company that regularly manufactures polyisocyanurate insulation panels and assembles ventilated nailbase insulation in-house with no outside fabrication operations.

### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Store products off the ground, in dry conditions, under cover and in manufacturer's unopened packaging until ready for installation.
- B. The manufacturer's plastic wrapping is provided for protection during shipment only. Replace any panels that become wet before installation.
- C. Protect insulation from open flame and keep dry at all times.

### **1.08 PROJECT CONDITIONS**

- A. Install only as much insulation as can be covered the same day by a completed roof covering material.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Basis of Design:
  - 1. "Cool Vent" Ventilated Nailbase Polyiso Panel by Hunter Panels, 15 Franklin Street, Portland, Maine 04101. ASD. Phone: (207) 761-5678 or (888) 746-1114. Fax: (877) 775-1769. E-mail: info@hpanels.com.
- B. Or approved equal.

### **2.02 PANEL CONSTRUCTION**

- A. 4 feet by 8 feet Panels shall consist of:
  - 1. A top layer of APA/TECO rated Oriented Strand Board (OSB):
    - a. Type: Standard CDX sheathing grade.
    - b. Thickness: 5/8 inch
  - 2. A middle layer of vented air space:
    - a. 1 inch thick solid wood spacers. Other materials such as woodfiber, EPS, or strips of foam will not be acceptable.
    - b. Spacers shall be not more than 12 inches apart in both the horizontal and vertical direction.
    - c. Spacers shall provide not less than 92 percent overall free air movement through the panel
    - d. Spacers shall provide 55 percent or greater lateral free air movement.
  - 3. Multiple layers of black fiber reinforced faced polyisocyanurate foam insulation:
    - a. Top layer will be manufactured as part of the system composite panel. Bottom layer to be shipped loose for installation to deck prior to composite panel.
    - b. Type: Polyisocyanurate foam insulation shall conform to ASTM C 1289, Type II.
    - c. Compressive Strength: 25 pounds per square inch, Grade 3
    - d. Thickness: 2.6 inches, each layer
    - e. R-value: 5.6 per inch minimum
- B. Panel with wood nailable surface as specified shall be factory rabbetted 1/8 inch on all sides to prove for expansion of substrate.

### **2.03 PANEL FASTENERS**

- A. Fasteners shall be manufacturer approved SIP/WD Panel fasteners for wood deck application. Fasteners have a 3/16 inch shank, and are corrosion resistant with oversized heads. Length of fasteners shall be as recommended by manufacturer. Use of 2 inch round plates are not required. See the manufacturer's application guide for instructions.
  - 1. Fasteners shall penetrate the wood deck a minimum of 1 inch .

### **2.04 VAPOR BARRIER**

- A. Provide 6 mil polyethylene plastic sheeting as indicated in roof types located on the drawings

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin installation until structural deck has been properly prepared.
- B. Verify deck, adjacent materials, and structural backing is dry and ready to receive insulation.
- C. Verify deck surface is flat, free of fins or protrusions and irregularities.

### **3.02 PREPARATION**

- A. Apply vapor barrier and or retarder, as specified or required by the local building code, to decking prior to the installation.
- B. Apply proper ridge and soffit vents to create an effective eave to ridge venting system in conjunction with vented panels.

### **3.03 INSTALLATION**

- A. Install panels with the OSB side face up. Place panels in the manufacturers recommended pattern. Only factory assembled panels will be accepted. Fasten panels through the top nailable surface and also through the wood block panel spacers using manufacturer approved threaded fasteners.
- B. For multiple layered installations, install the base layer of panels loose-laid, and stagger the joints of subsequent layers in accordance with good roofing practice.
- C. For roof slopes over 7/12 pitch the minimum number of fasteners shall be 24 per 4 foot by 8 foot panel.

### **3.04 PROTECTION**

- A. Protect installed products until completion of project.
- B. Cover the top and edges of unfinished roof panel work to protect it from the weather and to prevent accumulation of water in the cores of the panels.
- C. Do not leave panels exposed to moisture. Wet panels shall be removed or allowed to completely dry prior to application of vapor barrier and/or roof covering.
- D. Apply only enough insulation panels per day that can be covered the same day by a completed roof covering material.

**END OF SECTION**

**SECTION 07 3113**  
**ASPHALT SHINGLES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Asphalt shingle roofing.
- B. Flexible sheet membranes for eave protection, underlayment, and valley protection.
- C. Edge metals

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry.

**1.03 REFERENCE STANDARDS**

- A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
- B. ASTM D3161/D3161M - Standard Test Method for Wind-Resistance of Steep Slope Roofing Products (Fan-Induced Method); 2014.
- C. ASTM D3462/D3642M - Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced With Mineral Granules; 2010a.
- D. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012)e1.
- E. ASTM D4869/D4869M - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing; 2015.
- F. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2012.
- G. UL (RMSD) - Roofing Materials and Systems Directory; Underwriters Laboratories Inc.; current edition.

**1.04 SUBMITTALS**

- A. Product Data: Provide data indicating material characteristics, performance criteria, and limitations.
- B. Shop Drawings: For metal flashings, indicate fastening methods and locations and installation details.
- C. Samples: Submit two samples of each shingle color indicating color range and finish texture/pattern; for color selection.
- D. Manufacturer's Installation Instructions: Indicate installation criteria and procedures.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Maintenance Materials: Furnish the following for Owner's Representative's use in maintenance of project.
  - 1. Extra Shingles: 500 sq ft of each type and color.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, leak barrier, and ventilation, by a single manufacturer to ensure compatibility and optimum performance.
- B. Installer Qualifications:
  - 1. Installer shall be licensed or otherwise authorized by all federal, state and local authorities to install all products specified in this section.
  - 2. Installer must follow manufacturer published installation instructions.
  - 3. Installer must be a Preferred Contractor as defined and certified by manufacturer.

## **1.06 FIELD CONDITIONS**

- A. Proceed with work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

## **1.07 WARRANTY**

- A. Manufacturer's warranty: Furnish shingle manufacturer's 30 year warranty for the architectural asphalt shingles.

## **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Store all products in manufacturer's unopened, labeled packaging until they are ready for installation. Promptly verify quantities and conditions. Immediately remove damaged products from site.
- B. Store products in a covered, ventilated area, at temperature not more than 110 degrees F (43 degrees C); do not store near steam pipes, radiators, or in direct sunlight.
- C. Store bundles on a flat surface. Maximum stacking height shall not exceed manufacturer's recommendations. Store all rolls on end.
- D. Store and dispose of solvent-based materials in accordance with all federal, state and local regulations.

## **PART 2 PRODUCTS**

### **2.01 SHINGLES**

- A. Manufacturers:
  - 1. GAF; Timberline Ultra HD: [www.gaf.com](http://www.gaf.com).
  - 2. Owens Corning Corp; \_\_\_\_: [www.owenscorning.com](http://www.owenscorning.com).
  - 3. Certainteed Corporation; Product Landmark Series. [www.certainteed.com](http://www.certainteed.com)
  - 4. Or Approved Equal
- B. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462/D3642M; Class A fire resistance.
  - 1. Wind Resistance: Class F, when tested in accordance with ASTM D3161/D3161M.
  - 2. Algae Resistant.
  - 3. Self-sealing type.
  - 4. Basis of Design: TruDefinition Duration.

### **2.02 SHEET MATERIALS**

- A. Eave Protection Membrane: Thickness per manufacturer's requirement. Self-adhering polymer-modified asphalt sheet complying with ASTM D1970; with strippable treated release paper and polyethylene sheet top surface.
- B. Underlayment: Synthetic non-asphaltic sheet, intended by manufacturer for mechanically fastened roofing underlayment without sealed seams.
  - 1. Type: Woven polypropylene with anti-slip polyolefin coating on both sides.
  - 2. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
  - 3. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
  - 4. Fasteners: As specified by manufacturer and building code qualification report or approval, if any.

### **2.03 ACCESSORIES**

- A. Nails: Standard round wire shingle type, of hot-dipped zinc coated steel, 10 wire gage, 0.1019 inch shank diameter, 3/8 inch head diameter, of sufficient length to penetrate through roof sheathing or 3/4 inch into roof sheathing or decking.
- B. Ridge Vents: Plastic, extruded with vent openings that do not permit direct water or weather entry; flanged to receive shingles . Filtering type.

### **2.04 METAL FLASHINGS**

- A. Metal Flashings: Provide sheet metal eave edge, gable edge, and other flashing indicated.



1. Prefinished aluminum, .050" aluminum min. Fluoropolymer coated.
2. Color to be selected by Owner's Representative
3. Use fasteners compatible with material and recommended by manufacturer.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions prior to beginning work.
- B. Verify roof openings are correctly framed.
- C. Verify deck surfaces are dry, free of ridges, warps, or voids.

#### **3.02 PREPARATION**

- A. Follow shingle manufacturer's recommendations for acceptable roof deck material.
- B. Broom clean deck surfaces before installing underlayment or eave protection.
- C. Verify that the existing shingles are dry, sound, clean and smooth. All curled, buckled or loose tabs shall be nailed down or removed.

#### **3.03 INSTALLATION - UNDERLAYMENT**

- A. Underlayment: Install underlayment perpendicular to slope of roof, with ends and edges weather lapped minimum 4 inches. Stagger end laps of each consecutive layer. Nail in place. Weather lap minimum 4 inches over eave protection.
- B. Installation shall be in accordance with the instructions published by the manufacturer and local building codes.
- C. Items projecting through or mounted on roof: Weather lap and seal watertight with plastic cement.

#### **3.04 INSTALLATION - EAVE AND VALLEY PROTECTION**

- A. Install eave and valley protection at least 36 inches wide and centered on valley. Lap joints minimum of 6 inches (152 mm) and seal.
- B. Install flashing in accordance with manufacturer's written instructions.

#### **3.05 INSTALLATION - METAL FLASHING AND ACCESSORIES**

- A. Weather lap joints minimum 2 inches and seal weather tight with plastic cement.
- B. Items Projecting Through or Mounted on Roofing, including ridge vent: Flash and seal weather tight with plastic cement.

#### **3.06 INSTALLATION - SHINGLES**

- A. Install shingles in accordance with manufacturer's instructions and local building codes.
  1. Fasten individual shingles using 2 nails per shingle, or as required by code, whichever is greater.
  2. Fasten strip shingles using 4 nails per strip, or as required by code, whichever is greater.
- B. Place shingles in straight coursing pattern with 5 inch weather exposure to produce double thickness over full roof area. Provide double course of shingles at eaves.
- C. Project first course of shingles 1/2 inch beyond fascia boards.
- D. Extend shingles 1/2 inch beyond face of gable edge fascia boards.
- E. Coordinate installation of roof mounted components or work projecting through roof with weather tight placement of counterflashings.
- F. Complete installation to provide weather tight service.

#### **3.07 PROTECTION**

- A. Do not permit traffic over finished roof surface.

**END OF SECTION**

## **SECTION 07 4623**

### **WOOD SIDING**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Board siding for SIPs Walls .

##### **1.02 RELATED REQUIREMENTS**

- A. Section 06 1219 - Structural Insulated Panels: Siding substrate
- B. Section 06 2000 - Finish Carpentry: Exterior wood trim at windows.
- C. Section 07 9200 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.
- D. Section 09 9000 - Painting and Coating

##### **1.03 REFERENCE STANDARDS**

- A. APA B840 - 303 Siding Manufacturing Specifications; APA - The Engineered Wood Association; 2012.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17; West Coast Lumber Inspection Bureau; 2004, and supplements.

##### **1.04 SUBMITTALS**

- A. Product Data: Provide data indicating materials, component profiles, fastening methods, jointing details, sizes, surface texture, finishes, and accessories.
- B. Samples: Submit two samples 6 x 12 inch in size to applicator of finish paint for use in preparation of finish samples.

#### **PART 2 PRODUCTS**

##### **2.01 SIDING**

- A. Board Siding: Beveled, cedar, maximum moisture content of 10 percent.
  - 1. Exposure: 6"
  - 2. Surface Texture: Sanded. Prepare for stain finish.

##### **2.02 ACCESSORIES**

- A. Nails: Corrosion resistant type; non-staining, of size and strength to securely and rigidly retain the work; prefinished to match siding finish.
- B. Soffit Vents: size per drawings, finished to match soffit wood.
- C. Weather barrier: spunbonded polyolefin, non-woven, non-perforated, weather barrier membrane. Fasten and tape seams using manufacturer recommended products.

#### **PART 3 EXECUTION**

##### **3.01 EXAMINATION**

- A. Verify that substrates are ready to receive work.
- B. Verify that weather barrier has been installed over substrate completely and correctly.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is the responsibility of another installer, notify Owner's Representative of unsatisfactory preparation before proceeding.

##### **3.02 INSTALLATION**

- A. Fasten siding in place, level and plumb.
  - 1. Arrange for orderly nailing pattern. Blind nail except on over trim.
  - 2. Install siding for natural shed of water.

3. Position cut ends over bearing surfaces. Sand cut edges smooth and clean.
- B. Install board siding using single course method with 6 inch exposure.
  1. Nail at 12 inches on center.
  2. Miter horizontal joints tight at 45 degrees. Miter external and miter internal corners.
- C. Install corner strips and trim.
- D. Sand work smooth and set exposed nails and screws.

### **3.03 TOLERANCES**

- A. Maximum Variation From Plumb and Level: 1/4 inch per 10 feet.

**END OF SECTION**

## **SECTION 07 8400 FIRESTOPPING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Firestopping systems.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 09 2116 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

#### **1.03 REFERENCE STANDARDS**

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.
- B. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems; 2007 (Reapproved 2011).
- C. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

#### **1.04 SUBMITTALS**

- A. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- B. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and:
  - 1. With minimum 3 years documented experience installing work of this type.

#### **1.06 FIELD CONDITIONS**

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

### **PART 2 PRODUCTS**

#### **2.01 FIRESTOPPING - GENERAL REQUIREMENTS**

- A. Manufacturers:
  - 1. 3M Fire Protection Products: [www.3m.com/firestop](http://www.3m.com/firestop).
  - 2. Hilti, Inc: [www.us.hilti.com](http://www.us.hilti.com).
  - 3. Specified Technologies, Inc: [www.stifirestop.com](http://www.stifirestop.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

#### **2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS**

- A. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use any system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
- B. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

#### **2.03 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS**

- A. Penetrations By:
  - 1. Uninsulated Metallic Pipe, Conduit, and Tubing:

- a. 1 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
  - b. 1 Hour Construction: UL System W-L-1164; Hilti FS-ONE MAX Intumescent Firestop Sealant.
  - c. 1 Hour Construction: UL System W-L-1206; Hilti FS-ONE Intumescent Firestop Sealant.
- 2. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
  - a. 1 Hour Construction: UL System W-L-2078; Hilti CP 643N/644 Firestop Collar.
  - b. 1 Hour Construction: UL System W-L-2411; Hilti CP 648-E Firestop Wrap Strip.
  - c. 1 Hour Construction: UL System W-L-2128; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- 3. Electrical Cables Not In Conduit:
  - a. 1 Hour Construction: UL System W-L-3065; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CD 601S Elastomeric Firestop Sealant, or CP 618 Firestop Putty Stick.
  - b. 1 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
- 4. Insulated Pipes:
  - a. 1 Hour Construction: UL System W-L-5028; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- 5. HVAC Ducts, Insulated:
  - a. 1 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.

## **2.04 FIRESTOPPING SYSTEMS**

- A. Firestopping: Any material meeting requirements.
  - 1. Fire Ratings: See Drawings for required systems and ratings.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

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

### **3.02 PREPARATION**

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.

### **3.03 INSTALLATION**

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

### **3.04 CLEANING**

- A. Clean adjacent surfaces of firestopping materials.

**END OF SECTION**

## **SECTION 07 9005**

### **JOINT SEALERS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Sealants and joint backing.
- B. Precompressed foam sealers.

##### **1.02 RELATED REQUIREMENTS**

- A. Related sections too numerous to list individually. This section is referenced in affected individual sections.

##### **1.03 REFERENCE STANDARDS**

- A. ASTM C834 - Standard Specification for Latex Sealants; 2014.
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- E. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.
- F. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; [www.aqmd.gov](http://www.aqmd.gov).

##### **1.04 SUBMITTALS**

- A. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, limitations, and color availability.

##### **1.05 QUALITY ASSURANCE**

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

##### **1.06 FIELD CONDITIONS**

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

##### **1.07 WARRANTY**

- A. Correct defective work within a five year period after Date of Substantial Completion.
- B. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Gunnable and Pourable Sealants:
  - 1. Dow Corning Corporation: [www.dowcorning.com](http://www.dowcorning.com).
  - 2. Hilti, Inc: [www.us.hilti.com](http://www.us.hilti.com).
  - 3. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  - 4. Tremco Global Sealants: [www.tremcosealants.com](http://www.tremcosealants.com).
  - 5. Or Approved Equal
- B. Preformed Compressible Foam Sealers:
  - 1. EMSEAL Joint Systems, Ltd: [www.emseal.com](http://www.emseal.com).
  - 2. Sandell Manufacturing Company, Inc: [www.sandellmfg.com](http://www.sandellmfg.com).
  - 3. Dayton Superior Corporation: [www.daytonsuperior.com](http://www.daytonsuperior.com).
  - 4. Tremco Global Sealants: [www.tremcosealants.com](http://www.tremcosealants.com).
  - 5. Or Approved Equal

## 2.02 SEALANTS

- A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- B. Type 1 - General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25 minimum; Uses M, G, and A; single component.
  - 1. Color: Match adjacent finished surfaces.
- C. Type 2 - General Purpose Exterior Sealant: Acrylic, solvent release curing; ASTM C920, Grade NS, Class 12-1/2, Uses M, G, and A; single or multi- component.
  - 1. Color: Match adjacent finished surfaces.
  - 2. Applications: Use for:
    - a. Control, expansion, and soft joints in masonry.
    - b. Joints between concrete and other materials.
    - c. Joints between metal frames and other materials.
    - d. Other exterior joints for which no other sealant is indicated.
- D. Type 3 - Exterior Expansion Joint Sealer: Precompressed foam sealer; urethane with water-repellent;
  - 1. Size as required to provide weathertight seal when installed.
  - 2. Applications: Use for:
    - a. Exterior wall expansion joints.
- E. Type 4 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
  - 1. Color: Match adjacent finished surfaces.
  - 2. Applications: Use for:
    - a. Interior wall and ceiling control joints.
    - b. Joints between door and window frames and wall surfaces.
    - c. Other interior joints for which no other type of sealant is indicated.
- F. Type 5 - Bathtub/Tile Sealant: White silicone; ASTM C920, Uses I, M and A; single component, mildew resistant.
  - 1. Products:
    - a. BASF Construction Chemicals-Building Systems; : [www.buildingsystems.basf.com](http://www.buildingsystems.basf.com).
    - b. Pecora Corporation; 898NST Sanitary Silicone Sealant - Class 50: [www.pecora.com](http://www.pecora.com).
    - c. Tremco Global Sealants; : [www.tremcosealants.com](http://www.tremcosealants.com).
    - d. Or Approved Equal
- G. Type 6 - Acoustical Sealant for Concealed Locations:
  - 1. Composition: Acrylic latex emulsion sealant.
  - 2. Applications: Use for concealed locations only:
    - a. Sealant bead between top stud runner and structure and between bottom stud track and floor.
- H. Type 7 - Interior Floor Joint Sealant: Polyurethane, self-leveling; ASTM C920, Grade P, Class 25, Uses T, M and A; single component.
  - 1. Color: Match adjacent finished surfaces.
  - 2. Applications: Use for:
    - a. Expansion joints in floors.
- I. Type 8 - Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C920, Class 25, Uses T, I, M and A; single component.
  - 1. Color: Gray.
  - 2. Applications: Use for:
    - a. Joints in sidewalks and vehicular paving.
  - 3. Products:
    - a. Bostik Inc; : [www.bostik-us.com](http://www.bostik-us.com).

- b. Pecora Corporation; NR-201 Self-Leveling Traffic and Loop Sealant:  
www.pecora.com.
  - c. Sherwin-Williams Company; Stampede 1SL Polyurethane Sealant:  
www.sherwin-williams.com.
  - d. Or Approved Equal
- J. Type 9 - Butyl Sealant: ASTM C1311; single component, solvent release, non-skinning, non-sagging.
  - 1. Color: Match adjacent finished surfaces.
  - 2. Movement Capability: Plus and minus 12-1/2 percent.
  - 3. Service Temperature Range: -13 to 180 degrees F.
  - 4. Shore A Hardness Range: 10 to 30.
  - 5. Products:
    - a. Bostik Inc; : www.bostik-us.com.
    - b. Pecora Corporation; : www.pecora.com.
    - c. Sherwin-Williams Company; Storm Blaster All Season Sealant:  
www.sherwin-williams.com.
    - d. Or Approved Equal

### **2.03 ACCESSORIES**

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

### **3.02 PREPARATION**

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

### **3.03 INSTALLATION**

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
  - 1. Width/depth ratio of 2:1.
  - 2. Neck dimension no greater than 1/3 of the joint width.
  - 3. Surface bond area on each side not less than 75 percent of joint width.
- E. Install bond breaker where joint backing is not used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.



- G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- H. Tool joints concave.
- I. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

#### **3.04 PROTECTION**

- A. Protect sealants until cured.

**END OF SECTION**

**SECTION 08 1416**  
**WOOD DOORS AND FRAMES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Exterior and interior wood doors; flush and flush glazed configuration; fire rated and non-rated.
- B. Wood door frames
- C. Glazing.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Rough opening and blocking.
- B. Section 06 2000 - Finish Carpentry: For casing and trim.
- C. Section 08 7100 - Finish Hardware: For operating and locking hardware.
- D. Section 08 7100 - Door Hardware: For operating and locking hardware.
- E. Section 09 9000 - Painting and Coating: For staining of doors

**1.03 REFERENCE STANDARDS**

- A. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; National Fire Protection Association; 2016.
- D. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 2012.
- E. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- F. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; Window and Door Manufacturers Association; 2013. (ANSI/WDMA I.S. 1A)

**1.04 SUBMITTALS**

- A. Product Data: Indicate door core materials and construction; veneer species, type and characteristics. Glazing performance and material data.
- B. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- C. Verification Samples: Submit two corner samples, minimum 6 inches by 6 inches representing actual products and materials specified indicating visual characteristics and finish.
- D. Manufacturer's Installation Instructions: Indicate special installation instructions.
- E. Warranty, executed in Owner's Representative's name.

**1.05 QUALITY ASSURANCE**

- A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
- C. Single Source Requirements: To the greatest extent practical, wood doors shall be supplied from a single manufacturer.
- D. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire-rating as scheduled.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.

- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

## **1.07 WARRANTY**

- A. Doors and Frames: Provide manufacturer's warranty for 10 years.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, telegraphing core construction, and insulated glass units from seal failure, interpane dusting or misting..

## **PART 2 PRODUCTS**

### **2.01 DOORS**

- A. Doors: See drawings for locations and additional requirements.
  - 1. Quality Level: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS).
  - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
  - 3. Wood Species: Douglas Fir, preservative treated using treatment type suitable for required finish.
  - 4. Factory stained. Color to be selected by Owner's Representative.
- B. Glazed Exterior Doors: Flush solid core construction and aluminum clad.
  - 1. Thickness: 1-3/4 inches, unless otherwise indicated.
  - 2. Exterior Finish: Metal Cladding; formed aluminum, factory finished, factory fit to profile of wood members. Minimum thickness: .050"
  - 3. Interior Finish: Transparent Stained Finish: Scarf joints permitted if wood matches in color and grain texture.
  - 4. Basis of design: Andersen Windows, Inc.; E-Series Doors: [www.andersenwindows.com](http://www.andersenwindows.com).
- C. Main Entry Exterior Door: Flush solid core construction
  - 1. Thickness: 1-3/4 inches, unless otherwise indicated.
  - 2. Finish: Transparent Stained Finish: Scarf joints permitted if wood matches in color and grain texture.
- D. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
  - 1. Provide solid core doors at all locations.
  - 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with NFPA 252 or UL 10B - Negative (Neutral) Pressure; Underwriters Laboratories Inc. (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.

### **2.02 DOOR AND PANEL CORES**

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type structural composite lumber core (SCLC), plies and faces as indicated.
- B. Fire Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

### **2.03 DOOR FRAMES**

- A. Solid lumber door frames, species and finish to match door.

### **2.04 ACCESSORIES**

- A. Glazed Openings: Sealed insulating units, 1 inch thick, made of two layers of 1/4 inch tempered safety glass with 1/2" airspace.
  - 1. Heat-Strengthened and Fully Tempered Safety Glass: ASTM C1048. Comply with 16 CFR 1201 test requirements.
  - 2. Shall comply with ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.
  - 3. 1/2" Airspace, painted black

- 4. Coating: Low-E type, on #2 surface.
- B. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

## **2.05 DOOR CONSTRUCTION**

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
  - 1. Provide solid blocks at lock edge for hardware reinforcement.
  - 2. Provide solid blocking for other throughbolted hardware.
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- E. Provide edge clearances in accordance with the quality standard specified.

## **2.06 FACTORY FINISHING - WOOD VENEER DOORS**

- A. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:
  - 1. Transparent:
    - a. System - 12, Polyurethane, Water-based.
    - b. Stain: As selected by Owner's Representative.
    - c. Sheen: Satin.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

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

### **3.02 INSTALLATION**

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
  - 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing.

### **3.03 ADJUSTING**

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

### **3.04 SCHEDULE**

- A. Refer to Door and Frame Schedule appended to this section.

**END OF SECTION**

**SECTION 08 3100**  
**ACCESS DOORS AND PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wall access door and frame units.

**1.02 REFERENCE STANDARDS**

- A. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- B. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

**1.03 SUBMITTALS**

- A. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- B. Shop Drawings: Indicate exact position of all access door units.
- C. Manufacturer's Installation Instructions: Indicate installation requirements.

**PART 2 PRODUCTS**

**2.01 ACCESS DOOR AND PANEL APPLICATIONS**

- A. Walls, Unless Otherwise Indicated:
  - 1. Size: 12 by 12 inch, unless otherwise indicated.
  - 2. In All Wall Types: Surface mounted face frame and door surface flush with frame surface.
- B. Walls in Wet Areas:
  - 1. Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
  - 2. Size: 12 by 12 inch, unless otherwise indicated.
  - 3. Standard duty, hinged door.
  - 4. Tool-operated spring or cam lock; no handle.
  - 5. In All Wall Types: Surface mounted face frame and door surface flush with frame surface.
- C. Fire Rated Walls: See drawings for wall fire ratings.
  - 1. Material: Steel.
  - 2. Size: 12 by 12 inch, unless otherwise indicated.
- D. Ceilings, Unless Otherwise Indicated: Same type as for walls.
  - 1. Size in Other Ceilings: 12 by 12 inch, unless otherwise indicated.

**2.02 WALL AND CEILING UNITS**

- A. Manufacturers:
  - 1. ACUDOR Products Inc: [www.acudor.com](http://www.acudor.com).
    - a. Units in Walls, Unless Otherwise Indicated: ACUDOR ADWT.
    - b. Units in Fire-Rated Walls Rated 2 Hours and Less: ACUDOR FW-5015.
  - 2. Cendrex, Inc: [www.cendrex.com](http://www.cendrex.com).
    - a. Units in Walls, Unless Otherwise Indicated: Cendrex CTA, contoured cover concealing frame, hingeless with magnetic cover attachments, adjustable frame size.
    - b. Units in Fire-Rated Walls Rated 2 Hours and Less: Cendrex PFI series, insulated.
  - 3. Karp Associates, Inc: [www.karpinc.com](http://www.karpinc.com).
  - 4. Milcor by Commercial Products Group of Hart & Cooley, Inc: [www.milcorinc.com](http://www.milcorinc.com).
  - 5. Or approved equal.
- B. Access Doors: Factory fabricated door and frame units, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies that units are to be installed in.
  - 1. Style: Exposed frame with door surface flush with frame surface.
    - a. In Gypsum Board: Use drywall bead type frame.
  - 2. Door Style: Single thickness with rolled or turned in edges.
  - 3. Frames: 16 gage, 0.0598 inch, minimum.

4. Units in Fire Rated Assemblies: Fire rating as required by applicable code for the fire rated assembly that access doors are being installed.
5. Steel Finish: Primed.
6. Primed and Factory Finish: Polyester powder coat; color to match adjacent wall finish. .
7. Hardware:
  - a. Hardware for Fire Rated Units: As required for listing.
  - b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that rough openings are correctly sized and located.

#### **3.02 INSTALLATION**

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings. Secure rigidly in place.
- C. Position units to provide convenient access to the concealed work requiring access.

**END OF SECTION**

**SECTION 08 4113**  
**ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS**

**PART 1 GENERAL**

**1.01 WORK INCLUDED**

- A. Furnish and install aluminum architectural storefront system complete with hardware and related components as shown on drawings and specified in this section.
- B. Glazing of the storefront system
- C. Single Source Requirement
  - 1. All products listed in Section 1.02 shall be by the same manufacturer.

**1.02 LABORATORY TESTING AND PERFORMANCE REQUIREMENTS**

- A. Test Units
  - 1. Air, water, and structural test unit size shall be a minimum of two lites high and three lites wide.
- B. Test Procedures and Performance
  - 1. Air Infiltration Test
    - a. Test unit in accordance with ASTM E 283 at a static air pressure difference of 6.24 psf (299 Pa).
    - b. Air infiltration shall not exceed .06 cfm/SF (.30 l/s•m<sup>2</sup>) of unit.
  - 2. Water Resistance Test
    - a. Test unit in accordance with ASTM E 331.
    - b. There shall be no uncontrolled water leakage at a static test pressure of 12.0 psf (575 Pa).
    - c. (575 Pa).
  - 3. Uniform Load Deflection Test
    - a. Test in accordance with ASTM E 330.
    - b. Deflection under design load shall not exceed L/175 of the clear span.
  - 4. Uniform Load Structural Test
    - a. Test in accordance with ASTM E 330 at a pressure 1.5 times the design wind pressure in 1.05.B.3.b.
    - b. At conclusion of the test, there shall be no glass breakage, permanent damage to fasteners, storefront parts, or any other damage that would cause the storefront to be defective.
- C. Project Wind Loads
  - 1. The system shall be designed to withstand the following loads normal to the plane of the wall:
    - a. Positive pressure of 20 psf
    - b. Negative pressure of 20 psf

**1.03 QUALITY ASSURANCE**

- A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in 1.05.
- B. Test reports shall be accompanied by the storefront manufacturer's letter of certification stating that the tested storefront meets or exceeds the referenced criteria for the appropriate storefront type.

**1.04 SUBMITTALS**

- A. Contractor shall submit shop drawings; finish samples, test reports, and warranties.
  - 1. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.

**1.05 WARRANTIES**

- A. Total Storefront Installation

1. The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total storefront installation. This includes the glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water and structural adequacy as called for in the specifications and approved shop drawings.
  2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at their expense during the warranty period.
- B. Window Material and Workmanship
1. Provide written guarantee against defects in material and workmanship for 3 years from the date of final shipment.
- C. Finish and Glass
1. Warranty period shall be for 10 years from the date of final shipment.
  2. Provide organic finish warranty based on AAMA standard 2605.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Aluminum
1. Extruded aluminum shall be 6063-T6 alloy and temper.
- B. Glass - interior storefronts
1. Ship open for monolithic glass as follows:
    - a. 1/4" thick, clear tempered safety glass
    - b. All tempered architectural safety glass shall conform with ANSI Z97.1 and CPSC 16 CFR 1201.
- C. Glass - exterior doors (on wood frame)
1. Sealed insulating units, 1 inch thick, made of two layers of 1/4 inch glass with 1/2" airspace.
    - a. At locations required by local codes, provide safety glass: Heat-Strengthened and Fully Tempered Safety Glass: ASTM C1048. Comply with 16 CFR 1201 test requirements.
    - b. At locations not required to be safety glass, provide glass with Clear Heat Treatment - AN, HS or FT.
    - c. Shall comply with ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.
    - d. 1/2" Airspace, painted black.
    - e. Coating: Low-E type, on #2 surface.

### **2.02 FABRICATION**

- A. General
1. All aluminum frame extrusions shall have a minimum wall thickness of .080" (2 mm).
  2. All exposed work shall be carefully matched to produce continuity of line and design with all joints. System design shall be such that raw edges will not be visible at joints.
- B. Frame
1. Basis of Design - EFCO® System 401 Flush-Glazed Storefront
  2. Depth of frame shall not be less than 4 1/2" (114 mm).
  3. Face dimension shall not be less than 1 3/4" (50 mm).
  4. Frame components shall be screw spline construction.
- C. Doors
1. Basis of Design – EFCO® Durastile D518 Wide Stile Doors
  2. Door stiles shall be no less than 5" (127 mm) wide (not including glass stops).
  3. Door stiles and rails shall have hairline joints at corners. Heavy concealed reinforcement brackets shall be secured with screws and shall be of deep penetration and fillet welded.
  4. Weather stripping shall be wool pile and shall be installed in one stile of door pairs and in jamb stiles of center pivoted doors.



5. Major portions of the door sections shall have .188" (5 mm) wall thickness. Glazing stop sections shall have .050" (1.2 mm) wall thickness.
  6. Bottom Rail to have a smooth surface a minimum of 10"
  7. Hardware Listed for doors per 08 7100 Finish Hardware
- D. Glazing
1. All units shall be "dry glazed" with gaskets on both exterior and interior of the glass.
  2. Glazing Materials: Select glazing sealants, tapes, gaskets and additional glazing materials of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
    - a. Setting blocks to be 100% silicone with a durometer hardness of 85±5.
- E. Finish
1. Organic
    - a. Finish all exposed areas of aluminum windows and components with 50% 2-Coat Kynar. Color shall be as selected by the Owner's Representative.
    - b. AA Description AAMA Guide Spec.
    - c. AA-M12-C42-R1X50% PVDF Ultraflur™ 2604-98

## **PART 3 EXECUTION**

### **3.01 INSPECTION**

- A. Job Conditions
1. All openings shall be prepared by others to the proper size and shall be plumb, level and in the proper location and alignment as shown on the architect's drawings.
  2. Glazing Preparation: Immediately before glazing, clean glazing channels and other framing members receiving glass. Remove coatings not firmly bonded to substrates.

### **3.02 INSTALLATION**

- A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.
- B. Storefront system shall be erected plumb and true, in proper alignment and relation to established lines and grades.
- C. Entrance doors shall be securely anchored in place to a straight, plumb and level condition, without distortion. Weather stripping contact and hardware movement shall be checked and final adjustments made for proper operation and performance of units.
- D. Furnish and apply sealing materials to provide a weather tight installation at all joints and intersections and at opening perimeters.
- E. Sealing materials specified shall be used in strict accordance with the manufacturer's printed instructions, and shall be applied only by mechanics specially trained or experienced in their use. All surfaces must be clean and free of foreign matter before applying sealing materials. Sealing compounds shall be tooled to fill the joint and provide a smooth finished surface.

### **3.03 ANCHORAGE**

- A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

### **3.04 PROTECTION AND CLEANING**

- A. The general contractor shall protect the aluminum materials and finish against damage from construction activities and harmful substances. The general contractor shall remove any protective coatings as directed by the architect, and shall clean the aluminum surfaces as recommended for the type of finish applied.
- B. Clean excess sealant or compound from glass and framing members immediately after application using solvents or cleaners recommended by manufacturers.

## **END OF SECTION**

**SECTION 08 5200**  
**WOOD WINDOWS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Factory fabricated wood windows.
- B. Glazing.
- C. Operating hardware.
- D. Insect screens.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 2000 - Finish Carpentry: Trim

**1.03 REFERENCE STANDARDS**

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; American Architectural Manufacturers Association/Window and Door Manufacturers Association/Canadian Standards Association; 2011.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

**1.04 SUBMITTALS**

- A. Product Data: Provide data for materials, component dimensions, anchorage and fasteners, glass, internal drainage details, and finishes.
- B. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, installation requirements, and glass type.
- C. Manufacturer's Certificate: Certify that products furnished meet or exceed specified requirements.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer and Installer Qualifications: Company specializing in manufacturing residential wood windows with minimum three years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect factory finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

**1.07 FIELD CONDITIONS**

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

**1.08 WARRANTY**

- A. Correct defective Work within a five year period after Date of Substantial Completion.
- B. Provide 10 year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same.
- C. Warranty: Include coverage for the following:
  - 1. Degradation of color finish.
  - 2. Delamination or separation of finish cladding from window member.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Aluminum Clad Wood Windows:
  - 1. Andersen Windows, Inc.; E-Series Double-Hung Windows: [www.andersenwindows.com](http://www.andersenwindows.com).
  - 2. Pella Corp.; Architect Series: [www.pella.com](http://www.pella.com).
  - 3. Weather Shield Manufacturing, Inc.; Premium Series Double Hung Windows: [www.weathershield.com](http://www.weathershield.com).

4. Or approved equal.

## **2.02 WOOD WINDOWS**

- A. Wood Windows: Wood frame and sash, factory fabricated and assembled.
  1. Configuration: As indicated on drawings.
  2. Wood Species: Douglas Fir, preservative treated using treatment type suitable for required finish.
  3. Exterior Finish: Metal Cladding; formed aluminum, factory finished, factory fit to profile of wood members. Minimum thickness: .050"
  4. Interior Finish: Transparent Stained Finish: Scarf joints permitted if wood matches in color and grain texture. Refer to Section 09 9000 Painting and Coating.
  5. Insect Screen: Locate on outside of windows.

## **2.03 COMPONENTS**

- A. Glazing: Sealed insulating units, 1 inch thick, made of two layers of 1/4 inch glass with 1/2" airspace.
  1. At locations required by local codes, provide safety glass: Heat-Strengthened and Fully Tempered Safety Glass: ASTM C1048. Comply with 16 CFR 1201 test requirements.
  2. At locations not required to be safety glass, provide glass with Clear Heat Treatment - AN, HS or FT.
  3. Shall comply with ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.
  4. 1/2" Airspace, painted black.
  5. Coating: Low-E type, on #2 surface.
- B. Frames: sized to fit in walls, ref. drawing details. Flush solid wood glass stops. Sloped for wash.
- C. Sills: 1 inch nominal thickness, extruded aluminum; sloped for positive wash; fit under sash to project 3/4 inch beyond face of wall trim; one piece full width of opening.
- D. Muntins/Grilles: Grilles permanently installed between panes of insulating glass.
  1. Pattern: Custom design, see drawings.
  2. Bar Width: 3/4 inch.
  3. Color: Match interior and exterior of frame.
- E. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable hardware allowing screen removal without use of tools.
  1. Hardware: Spring loaded steel pins; four per screen unit.
  2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's standard mesh.
  3. Frame Finish: Baked enamel, color to match window interior color.
- F. Fasteners: Stainless steel.
- G. Sealants and Backing Materials: As recommended by manufacturer.
- H. Accessories: Provide related flashings, and anchorage and attachment devices.

## **2.04 PERFORMANCE REQUIREMENTS**

- A. Comply with AAMA/WDMA/CSA 101/I.S.2/A440 requirements for the specific window type in accordance with the following:
  1. Performance Class (PC): LC.
- B. Air infiltration shall not exceed 0.30 cfm/ft<sup>2</sup> (1.5 L/s•m<sup>2</sup>) when tested at 1.57 psf [75 Pa] according to ASTM E283.
- C. No water penetration when tested at the following pressure according to ASTM E547:
  1. [LC-PG50-H - 7.50 psf (360 Pa)]

## **2.05 ACCESSORIES**

- A. Sash lock: Lever handle with cam lock. Finish selection from manufacturer's full line.
- B. Sash lifts. Finish to match sash lock.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

### **3.02 INSTALLATION**

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Install glass and infill panels in accordance with Section 08 8000.
- E. Finish exterior surfaces with transparent materials as specified in Section 09 9000
- F. Finish interior surfaces with transparent materials as specified in Section 09 9000

### **3.03 TOLERANCES**

- A. Maximum Variation from Level or Plumb: 1/16 inch per 3 ft non-cumulative or 1/8 inch per 10 ft, whichever is less.

### **3.04 ADJUSTING**

- A. Adjust hardware for smooth operation and secure weathertight closure.

### **3.05 CLEANING**

- A. Remove protective material from factory finished surfaces.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.
- C. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

**END OF SECTION**

## **SECTION 08 7100**

### **FINISH HARDWARE**

#### **PART 1 --GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

##### **1.2 DESCRIPTION OF WORK**

- A. Definition: "Finish Hardware" includes items known commercially as finish hardware which are required for swing, sliding and folding doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame.
- B. Extent of finish hardware required is indicated on drawings and in schedules.
- C. Types of finish hardware required include the following:

- Butt Hinges
- Continuous Hinges
- Lock cylinders and keys
- Lock and latch sets
- Closers
- Overhead Holders
- Door trim units

##### **1.3 RELATED SECTIONS**

- A. Section 08 1416 – Wood Doors and Frames
- B. Section 08 4113 – Aluminum-Framed Entrances and Storefronts

##### **1.4 QUALITY ASSURANCE**

- A. Manufacturer: Obtain each type of hardware (latch and lock sets, etc.) from a single manufacturer.
- B. Supplier: Shall be an established firm dealing in contract builder's hardware, with adequate inventory and warehousing facilities, who has been furnishing hardware in the project's vicinity for a period of not less than 2 years, has qualified personnel on staff, located within 100 miles and who is, or who employs an experienced architectural hardware consultant who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements, to Owner, Architect and Contractor. The supplier must be a factory authorized dealer for all materials required.
- C. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." The hardware manufacturers are to supply the pre-installation conference as well as a post-installation walk-thru. This is to insure proper installation and provide for any adjustments or replacements of hardware as required. Review methods and procedures related to electrified door hardware including, but not limited to, the following:
  - 1. Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
  - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

3. Review required testing, inspecting, and certifying procedures.
  4. Review sequence of operation or each type of electrified door hardware.
- D. Where emergency exit devices are required on fire rated doors (with supplementary marking on doors with labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide labels on exit devices indicating "Fire Exit Hardware."
  - E. Hardware on doors from spaces of pupil occupancy shall be a type which will always permit the door to be opened from the inside of the room without direct manipulation of any type locking device. Doors between the Pool and the Locker Room are the only exception.
  - F. The supplier shall be responsible for field checking existing openings for proper application and sizes of strikes, hinges, locksets, closers, exit devices, etc. for all openings.

## 1.5 REGULATORY REQUIREMENTS

- A. Comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1, FED-STD-795, "Uniform Federal Accessibility Standards."
- B. Fire Rated Openings: Provide hardware for fire rated openings in compliance with NFPA Standard No. 80 and local building code requirements. Provide only hardware which has been tested and listed by UL or an approved testing agency for types and sizes of doors required and complies with requirements of door and door frame labels.
- C. Fire-Rated Assemblies: Upon completion of the installation, all fire door assemblies shall be tested to confirm proper operation of the closing device and that it meets all criteria of a fire door assembly as per NFPA 80 2007 Edition. At completion of the project, written record shall be furnished by the door hardware supplier and given to the owner to be made available to the Authority Having Jurisdiction, "AHJ". The record shall show all fire rated openings, door number and location, along with hardware supplied and installed for the opening. The inspection of the fire doors that are swinging doors with builders hardware type to be performed by individuals with knowledge and understanding of the operating components of the type of door being subjected to testing as required by the AHJ.

## 1.6 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data for each item of hardware in accordance with Division-1 section "Submittals". Include whatever information may be necessary to show compliance with requirements, and include instructions for installation and for maintenance of operating parts and finish.
- B. Hardware Schedule: Submit final hardware schedule in a vertical format as recognized by the Door and Hardware Institute (DHI). **Horizontal schedule format will not be accepted.** Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware.
  1. Final Hardware Schedule Content: Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
    - a. Type, style, function, size and finish of each hardware item.
    - b. Name and manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Index to include location of hardware set cross referenced to indications on drawings both on floor plans and in door and frame schedule.

- e. Explanation of all abbreviations, symbols, codes, etc., contained in schedule.
  - f. Mounting locations for hardware.
  - g. Door and frame sizes and materials.
  - h. Keying information.
  - i. Wiring diagrams with theory of operation.
- C. Submittal Sequence: Submit schedule in accordance to Division 1, particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.
- D. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- E. Samples if Requested: Prior to submittal of the final hardware schedule and prior to final ordering of finish hardware, submit one sample of each type of exposed hardware unit, finish as required, and tagged with full description for coordination with schedule.
- F. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory prepared for the installation of hardware. Upon request, check shop drawings of such other work, to confirm that adequate provisions are made for proper location and installation of hardware.
- G. Notify the Architect prior to submission of the required schedule, of any apparent discrepancies between the Hardware Specification, details or contract drawings.
- H. Review of the schedule by the Architect is for compliance with design intent only and shall not relieve this supplier from his responsibility to furnish all finish hardware required by the Contract Documents, whether included in the reviewed schedules or not. After the schedule has been reviewed, no items therein shall be changed without written approval of the Architect.
- I. Submit to General Contractor/Construction Manager, the factory order acknowledgement numbers for the various hardware items to be used on the project. The factory order acknowledgement numbers shall help to facilitate and expedite any service or warranty issues that may be required on a particular hardware item. General Contractor/Construction Manager shall keep these order acknowledgement numbers on file in the construction trailer.

## **1.7 PRODUCT HANDLING**

- A. Tag each item or package separately, with identification related to final hardware schedule, and include basic installation instructions with each item or package.
- B. Inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
- C. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.
- D. Provide secure lock-up for hardware delivered to the project, but not yet installed. Control handling and installation of hardware items which are not immediately replaceable, so that completion of the work will not be delayed by hardware losses, both before and after installation.

## **PART 2--PRODUCTS**

### **2.1 SCHEDULED HARDWARE**

A. Requirements for design, grade, function, finish, size and other distinctive qualities of each type of finish hardware are indicated in the Hardware Schedule at the end of this section. Products are identified by using hardware designation numbers of the following.

B. Manufacturer's Product Designations:

Butt Hinges:	Ives
Continuous Hinges:	Ives
Locksets:	Falcon
Cylinders:	Best
Closers:	LCN
Kickplates:	Ives
Silencers:	Ives
Wall Stops:	Ives
Threshold, Seals & Weatherstrip	National Guard Products
Miscellaneous:	Adams Rite, Glynn Johnson, Hager, Ives

### **2.2 MATERIALS AND FABRICATION**

A. General:

1. Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
2. Manufacturer's Name Plate: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location (omit removable nameplates), except in conjunction with required UL labels and as otherwise acceptable to Architect.
3. Manufacturer's identification will be permitted on rim of lock cylinders only.
4. Finish: All hardware finish shall match US26D unless otherwise indicated. Closer bodies, covers and arms shall be painted to match.
5. Lockset Design: Lever handle design shall be similar to Dane as manufactured by Falcon Lock Co.
6. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.
7. Furnish screws for installation, with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.
8. Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex screw fasteners.
9. Tools and Maintenance Instructions for Maintenance: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of finish hardware.

### **2.3 HINGES, BUTTS AND PIVOTS**



- A. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- B. Screws: Furnish Phillips flat-head or machine screws for installation of units, except furnish Phillips flat-head or wood screws for installation of units into wood. Finish screw heads to match surface of hinges or pivots.
- C. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
  - 1. Steel Hinges: Steel pins.
  - 2. Non-ferrous Hinges: Stainless steel pins.
  - 3. Out-swing Corridor Doors: Non-removable pins.
  - 4. Interior Doors: Non-rising pins.
  - 5. Tips: Flat button and matching plug, finished to match leaves.
  - 6. Number of hinges: Provide number of hinges indicated but not less than 3 hinges per door leaf for doors 90" or less in height and one additional hinge for each 30" of additional height.
- D. Acceptable Manufacturers:
  - 1. Ives
  - 2. McKinney
  - 3. Hager
- E. Supplier shall be responsible for the correct hinge size to fit any existing frames or doors.
- F. Furnish hinges in sizes and types as required by architect's details to achieve maximum degree of opening.

## **2.4 CONTINUOUS HINGES**

- A. Hinge shall be a pinless assembly of three interlocking extrusions applied to the full height of the door and frame without mortising. The door leaf and jamb leaf shall be geared together for the entire length of the hinge and joined by a channel. Hinge knuckle shall be monolithic in appearance. Continuous hinge with visible knuckle separations are not acceptable. Vertical door loads shall be carried on minimum 3/4" acetyl bearings through a full 180 degrees. The door leaf and jamb leaf shall have templated screw hole locations for future replacement needs. All heavy duty hinges (HD) shall have a minimum of 32 bearings for a 7' length.
- B. Acceptable Manufacturers:
  - 1. Ives
  - 2. Select Products
  - 3. Hager Roton

## **2.5 LOCK CYLINDERS AND KEYING**

- A. General: Supplier will meet with Owner to finalize keying requirements and obtain final instructions in writing.
- B. Review the keying system with the Owner and provide the type required (master, grandmaster or great-grandmaster), integrated with Owner's existing Best system. If key pinning charts are required, owner to furnish charts to hardware supplier.
- C. Furnish temporary keyed cores for the construction period. Contractor shall void the construction keying in the presence of the owner's representative.
- D. Metals: Construct lock cylinder parts from brass/bronze, stainless steel or nickel silver.

- E. Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock which is not designated to be keyed alike with a group of related locks.
- F. Permanently inscribe each key and cylinder with Visual Key Control that identifies cylinder manufacturer key symbol, and inscribe key with the notation "DO NOT DUPLICATE".
- G. Key Material: Provide keys of nickel silver only.
- H. Key Quantity:
  - 1. Furnish 3 change keys for each lock.
  - 2. 5 master keys for each master system.
  - 3. 5 grandmaster keys for each grandmaster system.
  - 4. One extra blank for each lock.
  - 5. 6 Construction master keys.
  - 6. 6 Control Keys – Construction and Permanent
- I. Deliver keys as directed by the owner.

## **2.6 LOCKS, LATCHES AND BOLTS**

- A. Locks shall meet these certifications:
  - 1. Mortise Locks – ANSI A156.13, 1994, Grade 1 Operational, ANSI/ASTM F476-76 Grade 30, UL listed. Levers shall be forged brass or bronze, cast stainless steel. Meets A117.1 Accessibility Codes. Steel Case with ¾" throw brass or stainless steel anti-friction latchbolt and a 1" throw brass or stainless steel deadbolt. Lock trim shall incorporate individual lever support springs in each rose or escutcheon. Lever connection by attaching threaded bushings tightened by a spanner wrench. Threaded set screws will not be accepted. Lock spindles shall be two independent inside and outside spindles to prevent manipulation of lock. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame.
    - a. Lock design shall be Falcon "MA" series "DG" design – Finish to be 626.
- B. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.
- C. Acceptable Manufacturers and Products:
  - 1. Corbin-Russwin "ML2000/CL3300" Series
  - 2. Sargent Lock Co. "8200/10 Line"
  - 3. Falcon Lock Co. "MA /T Series"

## **2.7 CLOSERS AND DOOR CONTROL DEVICES**

- A. Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit, depending upon size of door, exposure to weather and anticipated frequency of use.
- B. Closers: All door closers shall be cast iron from one manufacturer to provide for proper installation and servicing after installation. Closer shall carry a manufacturer's minimum ten year warranty for hydraulic units, two year for electric units.
- C. All door closers shall pass UL10C positive pressure fire test.

- D. All closers shall meet ANSI A156.4 Grade 1.
- E. Closers which incorporate pressure relief valve technology (PRV) will not be accepted.
- F. Furnish all drop plates, adapters, shoe supports, etc. as required for proper installation.
- G. Acceptable Manufacturers and Products:
  - 1. LCN – 4040XP Series
  - 2. Sargent – 281 (Less PRV)
  - 3. Corbin-Russwin – DC8000 Series

## **2.8 DOOR TRIM UNITS**

- A. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units (kick plates, edge trim, viewers, knockers, mail drops and similar units); either machine screws or self-tapping screws.
- B. Fabricate protection plates (armor, kick or mop) not more than 1-1/2" less than door width on stop side and not more than 1/2" less than door width on pull side, x the height indicated. All protection plates shall have all edges beveled (B4E).
- C. Metal Plates: Stainless steel, .050" (U.S. 18 ga.).
- D. All pull plates and handles to be thru-bolted. Install pull plate prior to push plate to conceal thru-bolts. Provide concealed fasteners for all push/pull applications.
- E. Acceptable Manufacturers:
  - 1. Ives
  - 2. Rockwood
  - 3. Quality

## **2.9 WEATHERSTRIP AND GASKETING**

- A. General: Except as otherwise indicated, provide continuous weather stripping at each leaf of every exterior door. Provide type, sizes and profiles shown or scheduled. Provide non-corrosive fasteners as recommended by manufacturer for application indicated.
- B. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips is easily replaceable and readily available from stocks maintained by the manufacturer.
- C. Acceptable Manufacturers:
  - 1. National Guard Products
  - 2. Reese
  - 3. Zero

## **2.10 THRESHOLDS**

- A. General: Except as otherwise indicated provide standard aluminum threshold unit of type, size and profile as shown or detailed.

- B. Provide welded custom thresholds where scheduled and noted in the hardware sets. Provide cover plates where scheduled.
- C. Provide thresholds that are 1" wider than depth of frame unless specified or detailed otherwise.
- D. Acceptable Manufacturers:
  - 1. National Guard Products
  - 2. Reese
  - 3. Zero

## 2.11 DOOR SILENCERS

All hollow metal frames shall have grey resilient type silencers. Furnish quantity (3) on single doors and quantity (2) on pairs of doors. Install new silencers on all existing frames with new doors.

## PART 3--EXECUTION

### 3.1 HARDWARE SCHEDULE

#### Hardware Set 01

For use on door #(s):

110

2	EA	CONT. HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	CD-24-C-C-718	626	FAL
1	EA	PANIC HARDWARE	CD-24-C-EO	626	FAL
1	EA	RIM CYLINDER	1E72	626	BES
2	EA	MORTISE CYLINDER	1E74	626	BES
2	EA	90 DEG OFFSET PULL	8190HD 10" STD	630	IVE
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	4111 EDA	689	LCN
2	EA	BLADE STOP SPACER	4110-61	689	LCN
2	EA	DOOR SWEEP	C627A	CL	NGP
1	EA	THRESHOLD	8425	AL	NGP

#### Hardware Set 02

For use on door #(s):

101A

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE LATCHSET	MA101 DG DANE	626	FAL
1	EA	PERMANENT CORE	AS REQUIRED	626	BES
1	EA	OH STOP	450S	630	GLY
3	EA	SILENCER	SR65	GRY	IVE

#### Hardware Set 03

For use on door #(s):

101                      102

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	MA521P6 DG	626	FAL
1	EA	PERMANENT CORE	AS REQUIRED	626	BES
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR65	GRY	IVE

#### Hardware Set 04

For use on door #(s):

108                      109                      205                      206

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	MA311 OCCUPIED/VACANT DGM DG	626	FAL
1	EA	SURFACE CLOSER	SC71 RW/PA Regular arm, pull side mount	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
3	EA	SILENCER	SR65	GRY	IVE

#### Hardware Set 05

For use on door #(s):

107

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	MA581HD7 DG	626	FAL
1	EA	PERMANENT CORE	AS REQUIRED	626	BES
1	EA	OH STOP	450S	630	GLY
3	EA	SILENCER	SR65	GRY	IVE

#### Hardware Set 06A

For use on door #(s):

103

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	MA581HD7 DG	626	FAL
1	EA	PERMANENT CORE	AS REQUIRED	626	BES
1	EA	OH STOP	450S	630	GLY
1	EA	SURFACE CLOSER	1461	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
3	EA	SILENCER	SR65	GRY	IVE

#### Hardware Set 06B

For use on door #(s):

106

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	MA581HD7 DG	626	FAL
1	EA	PERMANENT CORE	AS REQUIRED	626	BES
1	EA	SURFACE CLOSER	1461 - CUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
3	EA	SILENCER	SR65	GRY	IVE

#### Hardware Set 06C

For use on door #(s):

112

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	MA581HD7 DG	626	FAL
1	EA	PERMANENT CORE	AS REQUIRED	626	BES
1	EA	SURFACE CLOSER	1461 - CUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	SET	SEALS	5050B	BRN	NGP

#### Hardware Set 07

For use on door #(s):

203                      207                      208

3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	CD-25-R-NL	313AN	FAL
2	EA	MORTISE CYLINDER	1E74	626	BES
1	EA	90 DEG OFFSET PULL	8190HD 10" STD	630	IVE
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
* 1	EA	DOOR SWEEP	C627A	CL	NGP
* 1	EA	THRESHOLD	8425	AL	NGP

For door #203 only, add:

1	EA	ADAPTER PLATE	4110-18	689	LCN
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\* Provide if not supplied by door manufacturer

## Hardware Set 08

For use on door #(s):

209

1	EA	CONT. HINGE	112HD	628	IVE
1	SET	PUSH/PULL BAR	9190HD-10"-STD	630	IVE
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	CUSH SHOE SUPPORT	4110-30	689	LCN
1	EA	BLADE STOP SPACER	4110-61	689	LCN
1	EA	DOOR SWEEP	C607A	CL	NGP

### 3.2 INSTALLATION

- A. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by Architect.
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the Division-9 sections. Do not install surface-mounted items until finishes have been completed on the substrate.
- C. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant.
- E. Technical and Warranty Information:
  - 1. At the completion of the project, the technical and warranty information coalesced and kept on file by the General Contractor/Construction Manager shall be given to the Owner or Owner's Agent. In addition to both the technical and warranty information, all factory order acknowledgement numbers supplied to the General Contractor/Construction Manager during the construction period shall be given to the Owner or Owner's Agent. The warranty information and factory order acknowledgement numbers shall serve to both expedite and properly execute any warranty work that may be required on the various hardware items supplied on the project.
  - 2. Submit to General Contractor/Construction Manager, two copies each of parts and service manuals and two each of any special installation or adjustment tools. Include for locksets, exit devices, door closers and any electrical products.

### 3.3 ALTERATION NOTES

- A. Remove existing interfering hardware. All removed hardware shall remain the property of the Owner, unless otherwise directed.

- B. Remove all mechanical hold open devices from existing corridor and fire rated doors. Manual hold open closers shall be replaced or modified accordingly.
- C. This supplier shall be responsible to verify all existing condition and advise the architect of any discrepancies with scheduled hardware.
- D. Patch, repair and modify all doors, frames and hardware affected by scheduled replacement hardware.
- E. Install all surface mounted hardware on existing doors with thru bolts.

#### **3.4 ADJUST AND CLEAN**

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the acceptance of hardware in each area, the Installer, accompanied by the representative of the latch and lock manufacturer, shall return to the project and re-adjust every item of hardware to restore proper function of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

#### **END OF SECTION**



**SECTION 09 2116**  
**GYPSUM BOARD ASSEMBLIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

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

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Building framing, blocking and sheathing.
- B. Section 07 2100 - Thermal Insulation: Acoustic insulation.
- C. Section 07 9005 - Joint Sealers

**1.03 REFERENCE STANDARDS**

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- B. ASTM C514 - Standard Specification for Nails for the Application of Gypsum Board; 2004 (Reapproved 2014).
- C. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2009)e1.
- D. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- E. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- F. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- G. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- H. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- I. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- J. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- K. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2013.
- L. GA-600 - Fire Resistance Design Manual; Gypsum Association; 2015.
- M. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

**1.04 SUBMITTALS**

- A. Product Data: Provide data on gypsum board, accessories, and joint finishing system.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 5 years of documented experience.
- B. Copies of Documents at Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

**PART 2 PRODUCTS**

**2.01 GYPSUM BOARD ASSEMBLIES**

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Interior Partitions: Provide completed assemblies with the following characteristics:

1. Acoustic Attenuation: STC of 33 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
  1. Fire Rated Partitions: See drawings for locations; 1 hour rating.
  2. Fire Rated Shaft Walls: UL listed assembly No. U415; 1 hour rating.
  3. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

## **2.02 BOARD MATERIALS**

- A. Manufacturers - Gypsum-Based Board:
  1. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  2. Georgia-Pacific Gypsum: [www.gpgypsum.com](http://www.gpgypsum.com).
  3. Lafarge North America Inc: [www.lafargenorthamerica.com](http://www.lafargenorthamerica.com).
  4. National Gypsum Company: [www.nationalgypsum.com](http://www.nationalgypsum.com).
  5. USG Corporation: [www.usg.com](http://www.usg.com).
  6. Or Approved Equal
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
  1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
  2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
  4. Thickness:
    - a. Vertical Surfaces: 5/8 inch.
- C. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
  1. Application: Ceilings, unless otherwise indicated.
  2. Thickness: 1/2 and 5/8 inch.
  3. Edges: Tapered.
- D. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut. Refer to drawings for additional information.
  1. Paper Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
  2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  3. Products:
    - a. National Gypsum Company; Gold Bond Brand 1" Fire-Shield Shaftliner XP (mold-resistant).
    - b. USG Corporation; Sheetrock Gypsum Liner Panels--Enhanced (mold-resistant).
    - c. Or Approved Equal

## **2.03 ACCESSORIES**

- A. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
  1. Types: As detailed or required for finished appearance.
- B. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
  1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
  2. Ready-mixed vinyl-based joint compound.
- C. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- D. Nails for Attachment to Wood Members: ASTM C514.

- E. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.
- F. Adhesive for Attachment to Wood, ASTM C557:

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

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

#### **3.02 SHAFT WALL INSTALLATION**

- A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
- B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.

#### **3.03 BOARD INSTALLATION**

- A. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- C. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- D. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For non-rated assemblies, install as follows:
  - 1. Single-Layer Applications: Adhesive application.

#### **3.04 INSTALLATION OF TRIM AND ACCESSORIES**

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
  - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

#### **3.05 JOINT TREATMENT**

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
  - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
  - 2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
  - 2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
- D. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

#### **3.06 TOLERANCES**

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

**END OF SECTION**

## **SECTION 09 3000**

### **TILING**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Cementitious backer board as wall tile substrate.
- D. Stone thresholds.
- E. Non-ceramic trim.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 07 9005 - Joint Sealers.
- B. Section 09 2116 - Gypsum Board Assemblies: Tile backer board.
- C. Section 09 6723 - Resinous Flooring

##### **1.03 REFERENCE STANDARDS**

- A. ANSI A108.1B - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- B. ANSI A108.1C - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- C. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).
- D. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- E. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (Reaffirmed 2010).
- F. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2010).
- G. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reapproved 2010).
- H. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reapproved 2010).
- I. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2010 (Revised).
- J. ANSI A108.12 - American National Standard Specifications for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).
- K. ANSI A108.13 - American National Standard Specifications for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2010).
- L. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).
- M. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2010 (Revised).
- N. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2010).

- O. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014.
- P. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014.
- Q. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2012.
- R. ANSI A136.1 - American National Standard Specifications for Organic Adhesives for Installation of Ceramic Tile; 2008 (Reaffirmed 2013).
- S. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2015.

#### **1.04 SUBMITTALS**

- A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- B. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.
- C. Maintenance Materials: Furnish the following for Owner's Representative's use in maintenance of project.

#### **1.05 QUALITY ASSURANCE**

- A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
- C. Installer Qualifications: Company specializing in performing tile installation, with minimum of five years of documented experience.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

#### **1.07 FIELD CONDITIONS**

- A. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

### **PART 2 PRODUCTS**

#### **2.01 TILE**

- A. Natural Stone Wall Tile: Basis of Design: "unfaded mottled green & purple" by Vermont Structural Slate: <http://www.vermontstructuralslate.com/stones#stones-slate>
  - 1. Composition: Natural Slate Stone.
  - 2. Single Tiles:
    - a. Sizes: vary, to facilitate pattern. Maximum size 24"x24"
    - b. "Random ashlar" pattern
    - c. Thickness: 3/8 inch
  - 3. Joints: 1/4" wide
  - 4. Face: honed.
  - 5. Edges: Square.
  - 6. Moisture Absorption: 0 to 0.3 percent, maximum.
- B. Natural Stone Floor Tile: Basis of Design: "unfaded mottled green & purple" by Vermont Structural Slate: <http://www.vermontstructuralslate.com/stones#stones-slate>
  - 1. Composition: Natural Slate Stone.
  - 2. Single Tiles:
    - a. Sizes: vary, to facilitate pattern. Maximum size 24"x24"
    - b. "Random ashlar" pattern
    - c. Thickness: 1/2 inch min.
  - 3. Joints: 3/8" wide

4. Face: natural cleft.
5. Edges: Square.
6. Moisture Absorption: 0 to 0.3 percent, maximum.

## **2.02 TRIM AND ACCESSORIES**

- A. Non-Ceramic Trim: Brushed stainless steel, style and dimensions to suit application, for setting using tile mortar or adhesive.
  1. Applications:
    - a. Open edges of wall tile at top.
  2. Profile: Square
  3. Manufacturers:
    - a. Basis of Design: Schluter-Systems: [www.schluter.com](http://www.schluter.com).
- B. Thresholds: Marble, white or gray, honed finish; 2 inches wide by full width of wall or frame opening; 1/2 inch thick; beveled one long edge with radiused corners on top side; without holes, cracks, or open seams.

## **2.03 SETTING MATERIALS**

- A. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4 or ANSI A118.15.
  1. Products:
    - a. ARDEX Engineered Cements; ARDEX X 77 MICROTEC: [www.ardexamericas.com](http://www.ardexamericas.com).
    - b. AVM Industries, Inc; Thin-Set 780: [www.avmindustries.com](http://www.avmindustries.com).
    - c. LATICRETE International, Inc; LATICRETE 254 Platinum: [www.laticrete.com](http://www.laticrete.com).
    - d. Substitutions: See Section 01 6000 - Product Requirements.
- B. Organic Adhesive: ANSI A136.1, thinset mastic type.
  1. Use Type I in areas subject to prolonged moisture exposure.
  2. Products:
    - a. ARDEX Engineered Cements; ARDEX D14: [www.ardexamericas.com](http://www.ardexamericas.com).
    - b. Bostik Inc: [www.bostik-us.com](http://www.bostik-us.com).
    - c. LATICRETE International, Inc; LATICRETE 15 Premium Mastic: [www.laticrete.com](http://www.laticrete.com).

## **2.04 GROUTS**

- A. Manufacturers:
  1. ARDEX Engineered Cements: [www.ardexamericas.com](http://www.ardexamericas.com).
  2. ProSpec, an Oldcastle brand: [www.prospec.com](http://www.prospec.com).
  3. Bostik Inc: [www.bostik-us.com](http://www.bostik-us.com).
  4. LATICRETE International, Inc: [www.laticrete.com](http://www.laticrete.com).
- B. Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
  1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
  2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
  3. Color(s): As selected by Owner's Representative from manufacturer's full line.
- C. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
  1. Applications: Between tile and plumbing fixtures.
  2. Color(s): As selected by Owner's Representative from manufacturer's full line.
  3. Products:
    - a. ARDEX Engineered Cements; ARDEX SX: [www.ardexamericas.com](http://www.ardexamericas.com).
    - b. LATICRETE International, Inc; LATICRETE Latasil: [www.laticrete.com](http://www.laticrete.com).
    - c. Merkrete, by Parex USA, Inc; Merkrete Colored Caulking: [www.merkrete.com](http://www.merkrete.com).
- D. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
  1. Composition: Water-based colorless silicone.

## **2.05 ACCESSORY MATERIALS**

- A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
  - 1. Thickness: 20 mils, maximum.
  - 2. Crack Resistance: No failure at 1/16 inch gap, minimum.
- B. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
  - 1. Type: Fluid-applied.
  - 2. Material: SBS rubber.
  - 3. Thickness: 25 mils, minimum, dry film thickness.
  - 4. Products:
    - a. ARDEX Engineered Cements; ARDEX 8+9: [www.ardexamericas.com](http://www.ardexamericas.com).
    - b. AVM Industries, Inc; System 750 with polyester fabric reinforcing at edges, corners, joints, and cracks: [www.avmindustries.com](http://www.avmindustries.com).
    - c. LATICRETE International, Inc; LATICRETE Hydro Ban: [www.laticrete.com](http://www.laticrete.com).
    - d. Substitutions: See Section 01 6000 - Product Requirements.
- C. Underlayment at Floors: Specifically designed for bonding to thin-set setting mortar; not primarily a waterproofing material and having the following characteristics:
  - 1. Suitable for installation over wood-based substrates.
  - 2. Do Not Use: Gypsum or cementitious based self-leveling underlayment.
- D. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.
- D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

### **3.02 PREPARATION**

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

### **3.03 INSTALLATION - GENERAL**

- A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1A thru A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

- E. Form internal angles square and external angles bullnosed.
- F. Install non-ceramic trim in accordance with manufacturer's instructions.
- G. Install thresholds where indicated.
- H. Sound tile after setting. Replace hollow sounding units.
- I. Keep control and expansion joints free of mortar, grout, and adhesive.
- J. Keep expansion joints free of adhesive or grout. Apply sealant to joints.
- K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- L. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.
- N. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

#### **3.04 INSTALLATION - FLOORS - THIN-SET METHODS**

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
  - 1. Use uncoupling membrane under all tile unless other underlayment is indicated.
  - 2. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.
- B. Over wood substrates, install in accordance with TCNA (HB) Method F142, with standard grout, unless otherwise indicated.
- C. Over wood substrate with backer board underlayment, install in accordance with TCNA (HB) Method F144, for cementitious backer boards, with standard grout.

#### **3.05 INSTALLATION - WALL TILE**

- A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

#### **3.06 CLEANING**

- A. Clean tile and grout surfaces.

#### **3.07 PROTECTION**

- A. Do not permit traffic over finished floor surface for 4 days after installation.

**END OF SECTION**



**SECTION 09 5100**  
**SUSPENDED ACOUSTICAL CEILINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 9005 - Joint Sealers: Acoustical sealant.

**1.03 REFERENCE STANDARDS**

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2013.
- C. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

**1.04 ADMINISTRATIVE REQUIREMENTS**

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

**1.05 SUBMITTALS**

- A. Product Data: Provide data on suspension system components and acoustical units.
- B. Manufacturer's Installation Instructions: Indicate special procedures.
- C. Maintenance Materials: Furnish the following for Owner's Representative's use in maintenance of project.
  - 1. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

**1.06 QUALITY ASSURANCE**

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

**PART 2 PRODUCTS**

**2.01 ACOUSTICAL UNITS**

- A. Manufacturers:
  - 1. Armstrong World Industries, Inc: [www.armstrong.com](http://www.armstrong.com).
  - 2. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  - 3. USG: [www.usg.com](http://www.usg.com).
  - 4. Or approved equal
- B. Acoustical Tile: Painted mineral fiber, ASTM E1264 Type III, with the following characteristics:
  - 1. Size: 24 by 24 inches.
  - 2. Thickness: 5/8 inches.
  - 3. Joint: Kerfed and rabbeted.
  - 4. Edge: Square tegular.
  - 5. Surface Color: White.
  - 6. Surface Pattern: fine fissured.

**2.02 SUSPENSION SYSTEM(S)**

- A. Manufacturers:
  - 1. Same as for acoustical units.

- B. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
  - 1. Profile: Tee; 15/16 inch wide face.
  - 2. Construction: Double web.
  - 3. Finish: White painted.

### **2.03 ACCESSORIES**

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
  - 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- C. Touch-up Paint: Type and color to match acoustical and grid units.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

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

### **3.02 INSTALLATION - SUSPENSION SYSTEM**

- A. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- B. Locate system on room axis according to reflected plan.
- C. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- D. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- E. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- F. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- G. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- H. Do not eccentrically load system or induce rotation of runners.
- I. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
  - 1. Use longest practical lengths.
  - 2. Overlap and rivet corners.

### **3.03 INSTALLATION - ACOUSTICAL UNITS**

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
  - 1. Make field cut edges of same profile as factory edges.

G. Where round obstructions occur, provide preformed closures to match perimeter molding.

**3.04 TOLERANCES**

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

**END OF SECTION**

**SECTION 09 6429**  
**WOOD PLANK FLOORING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wood plank flooring, nailed.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1500 - Wood Decking: Subfloor
- B. Section 09 9000 - Painting and Coating

**1.03 REFERENCE STANDARDS**

- A. MFMA (SPEC) - Guide Specifications for Maple Flooring Systems; Maple Flooring Manufacturers Association; current edition.
- B. NWFA (IG) - Installation Guidelines; National Wood Flooring Association; current edition located at [www.nwfa.org](http://www.nwfa.org).

**1.04 SUBMITTALS**

- A. Product Data: Provide data for flooring.
- B. Samples: Submit two samples 4 x 12 inch in size illustrating floor finish, color, and sheen.
- C. Installation Instructions: Indicate standard and special installation procedures.
- D. Maintenance Data: Include maintenance procedures.
- E. Maintenance Materials: Furnish the following for Owner's Representative's use in maintenance of project.
  - 1. Extra Flooring Material: 10 square yards matching installed flooring.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of this section with minimum five years experience.

**1.06 FIELD CONDITIONS**

- A. Do not install wood flooring until wet construction work is complete and ambient air at installation space has moisture content stabilized at maximum moisture content of 40 percent.
- B. Provide heat, light, and ventilation prior to installation.
- C. Store materials in area of installation for minimum period of 24 hours prior to installation.
- D. Maintain minimum room temperature of 65 degrees F for a period of two days prior to delivery of materials to installation space, during installation, and after installation.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Wood Plank Flooring:
  - 1. Species: White Hard Maple.
  - 2. Grade: First.
  - 3. Cut: Flat grain.
  - 4. Moisture Content: 7 to 9 percent.
  - 5. Actual Thickness: 25/32 inch.
  - 6. Actual Width: 5 inches.
  - 7. Edge: Tongue and Groove.
  - 8. End: End matched.
  - 9. Length: Random, minimum of 30 inches.
- B. Flooring Nails: Type recommended by flooring manufacturer.

- C. Sheathing Paper: Plain building paper.

## **2.02 ACCESSORIES**

- A. Wood Base: Same species as flooring; profile as indicated.
- B. Wood Plugs: Round shape, 3/4 inch diameter by 1/8 inch thick, of same species as flooring.
- C. Transition Strip: Same species and finish as flooring material; profiles indicated.
- D. Floor Finish: Polyurethane, to achieve satin sheen surface; type recommended by flooring manufacturer. Refer to Section 09 9000 Painting and Coating for additional requirements.

## **2.03 SOURCE QUALITY CONTROL**

- A. Inspect and stamp species and grade on underside of each piece of wood flooring at factory.

# **PART 3 EXECUTION**

## **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that required floor-mounted utilities are in correct location.

## **3.02 INSTALLATION**

- A. Sheathing Paper: Place over wood subfloor; lap edges and ends 2 inches, staple in place.
- B. Wood Flooring:
  - 1. Install in accordance with manufacturer's, MFMA, and NOFMA instructions; blind nail to wood sub-floor.
  - 2. Lay flooring in patterns indicated on drawings. Verify alignment as work progresses.
  - 3. Arrange flooring with end matched grain set flush and tight.
  - 4. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar; provide divider strips and transition strips in accordance with flooring manufacturer's recommendations and as indicated.
  - 5. Install edge strips at unprotected or exposed edges, and where flooring terminates.
  - 6. Secure edge strips before installation of flooring with stainless steel screws.
  - 7. Install flooring tight to floor access covers.
  - 8. Provide 1/2 inch expansion space at fixed walls and other interruptions.
- C. Finishing:
  - 1. Mask off adjacent surfaces before beginning sanding.
  - 2. Sand flooring to smooth even finish with no evidence of sander marks. Take precautions to contain dust. Remove dust by vacuum.
  - 3. Apply finish in accordance with floor finish manufacturer's and MFMA instructions.
  - 4. Apply first coat, allow to dry, then buff lightly with steel wool to remove irregularities. Vacuum clean and wipe with damp cloth before applying succeeding coat.
  - 5. Lightly buff between coats with steel wool and vacuum clean before applying succeeding coat.
  - 6. Apply last coat of finish.

## **3.03 CLEANING**

- A. Clean and polish floor surfaces in accordance with floor finish manufacturer's instructions.

## **3.04 PROTECTION**

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. Place protective coverings over finished floors; do not remove coverings until Substantial Completion.

**END OF SECTION**

**SECTION 09 6723**  
**RESINOUS FLOORING**

**PART 1 – GENERAL**

**1.01 SUMMARY**

- A. This section includes the following:
  - 1. Resinous flooring system as shown on the drawings and in schedules.
- B. Related sections include the following:
  - 1. Cast-in-Place Concrete, section 03 30 00
  - 2. Rough Carpentry, section 06 1000

**1.02 SYSTEM DESCRIPTION**

- A. The work shall consist of preparation of the substrate, the furnishing and application of a cementitious urethane based self-leveling seamless flooring system with decorative quartz aggregate broadcast and Epoxy broadcast and topcoats.
- B. The system shall have the color and texture as specified by the Owner's Representative with a nominal thickness of 1/4 inch. It shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.
- C. Cove base to be applied at all locations where flooring is installed and per manufacturers standard details unless otherwise noted.

**1.03 SUBMITTALS**

- A. Product Data: Latest edition of Manufacturer's literature including performance data and installation procedures.
- B. Manufacturer's Material Safety Data Sheet (MSDS) for each product being used.
- C. Samples: A 3 inch square sample of the proposed system. Color, texture, and thickness shall be representative of overall appearance of finished system.

**1.04 QUALITY ASSURANCE**

- A. The Manufacturer shall have a minimum of 5 years experience in the production, sales, and technical support of cementitious urethane, MMA industrial flooring, colored quartz aggregate and related materials.
- B. The Applicator shall have been approved by the flooring system manufacturer in all phases of surface preparation and application of the product specified.
- C. No requests for substitutions shall be considered that would change the generic type of the specified System.
- D. System shall be in compliance with requirements of United States Department of Agriculture (USDA), Food, Drug Administration (FDA), and local Health Department.
- E. A pre-installation conference shall be held between Applicator, General Contractor and the Owner's Representative to review and clarification of this specification, application procedure, quality control, inspection and acceptance criteria and production schedule.

**1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Packing and Shipping
  - 1. All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.
- B. Storage and Protection
  - 1. The Applicator shall be provided with a dry storage area for all components. The area shall be between 60 F and 85 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.
  - 2. Copies of Material Safety Data Sheets (MSDS) for all components shall be kept on site for review by the Owner's Representative.
- C. Waste Disposal

1. The Applicator shall be provided with adequate disposal facilities for non-hazardous waste generated during installation of the system.

## **1.06 PROJECT CONDITIONS**

- A. Site Requirements
  1. Application may proceed while air, material and substrate temperatures are between 60 F and 85 F providing the substrate temperature is above the dew point. Outside of this range, the Manufacturer shall be consulted.
  2. The relative humidity in the specific location of the application shall be less than 85 % and the surface temperature shall be at least 5 F above the dew point.
  3. The Applicator shall ensure that adequate ventilation is available for the work area. This shall include the use of manufacturer's approved fans, smooth bore tubing and closure of the work area.
  4. The Applicator shall be supplied with adequate lighting equal to the final lighting level during the preparation and installation of the system.
- B. Conditions of new concrete to be coated with cementitious urethane material.
  1. Concrete shall be moisture cured for a minimum of 3 days and have fully cured a minimum of 5 days in accordance with ACI-308 prior to the application of the coating system pending moisture tests.
  2. Concrete shall have a flat rubbed finish, float or light steel trowel finish (a hard steel trowel finish is neither necessary nor desirable).
  3. Sealers and curing agents should not to be used.
  4. Concrete shall have a minimum design strength of 3,500 psi. and a maximum water/cement ratio of 0.45
  5. Concrete surfaces on grade shall have been constructed with a vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.
- C. Safety Requirements
  1. All open flames and spark-producing equipment shall be removed from the work area prior to commencement of application.
  2. "No Smoking" signs shall be posted at the entrances to the work area.
  3. The Owner's Representative shall be responsible for the removal of foodstuffs from the work area.
  4. Non-related personnel in the work area shall be kept to a minimum.

## **1.07 WARRANTY**

- A. Dur-A-Flex, Inc. warrants that material shipped to buyers at the time of shipment substantially free from material defects and will perform substantially to Dur-A-Flex, Inc. published literature if used in accordance with the latest prescribed procedures and prior to the expiration date.
- B. Dur-A-Flex, Inc. liability with respect to this warranty is strictly limited to the value of the material purchase.

## **PART 2 – PRODUCTS**

### **2.01 FLOORING**

- A. Basis of Design: Dur-A-Flex, Inc, Hybri-Flex EQ (self leveling broadcast quartz), epoxy/aliphatic urethane topcoat seamless flooring system.
  1. System Materials:
    - a. Topping: Dur-A-Flex, Inc, Poly-Crete MD resin, hardener and SL aggregate.
    - b. The broadcast aggregate shall be Dur-A-Flex, Inc. Q28 or Q11 quartz aggregate.
    - c. Broadcast: Dur-A-Flex, Inc. Dur-A-Glaze #4, epoxy based two-component resin.
    - d. Grout coat: Dur-A-Flex, Inc Dur-A-Glaze #4, epoxy-based, two-component resin.
    - e. Top coat: Dur-A-Flex, Inc. Armor Top aliphatic urethane two-component resin.
  2. Patch Materials
    - a. Shallow Fill and Patching: Use Dur-A-Flex, Inc. Poly-Crete MD (up to ¼ inch).
    - b. Deep Fill and Sloping Material (over ¼ inch): Use Dur-A-Flex, Inc. Poly-Crete WR.

## 2.02 MANUFACTURER

- A. Basis of Design: Dur-A-Flex, Inc., 95 Goodwin Street, East Hartford, CT 06108, Phone: (860) 528-9838, Fax: (860) 528-2802
- B. Manufacturer of Approved System shall be single source and made in the USA.
- C. Or Approved Equal.

## 2.03 PRODUCT REQUIREMENTS

- |  |                              |
|--|------------------------------|
| A. Topping                                       | Poly-Crete SL                |
| 1. Percent Reactive                              | 100 %                        |
| 2. VOC   | 0 g/L                        |
| 3. Bond Strength to Concrete ASTM D 4541         | 400 psi, substrates fails    |
| 4. Compressive Strength, ASTM C 579              | 9,000 psi                    |
| 5. Tensile Strength, ASTM D 638                  | 2,175 psi                    |
| 6. Flexural Strength, ASTM D 790                 | 5,076 psi                    |
| 7. Impact Resistance @ 125 mils, MIL D-3134,     | 160 inch lbs                 |
| No visible damage or deterioration               |                              |
| B. Broadcast Coat                                | Dur-A-Glaze #4 Resin         |
| 1. Percent Reactive,                             | 100 %                        |
| 2. VOC   | <4 g/L                       |
| 3. Water Absorption, ASTM D 570                  | 0.04%                        |
| 4. Tensile Strength, ASTM D 638                  | 4000psi                      |
| 5. Coefficient of thermal expansion, ASTM D 696, | 2 x 10 <sup>-5</sup> in/in/F |
| 6. Flammability ASTM D-635                       | Self-Extinguishing           |
| 7. Flame Spread/ NFPA 101 ASTM E-84              | Class A                      |
| C. Topcoat                                       | Armor Top                    |
| 1. VOC   | 0 g/L                        |
| 2. 60 Degree Gloss ASTM D523                     | 75+/-5                       |
| 3. Mixed Viscosity, (Brookfield 25oC)            | 500 cps                      |
| 4. Tensile strength, ASTM D 638                  | 7,000 psi                    |
| 5. Abrasion Resistance, ASTM D4060               | Gloss Satin                  |
| CS 17 wheel (1,000 g load) 1,000 cycles          | 4 8 mg loss with grit        |
|  | 10 12 mg loss without grit   |
| 6. Pot life @ 70o F 50% RH                       | 2 hours                      |
| 7. Full Chemical resistance                      | 7 days                       |

## PART 3 – EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, areas and conditions, with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.
- B. Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

### 3.02 PREPARATION

- A. General
  - 1. New and existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.
  - 2. Moisture Testing: Perform tests recommended by manufacturer and as follows.
    - a. Perform anhydrous calcium chloride test ASTM F 1869-98. Application will proceed only when the vapor/moisture emission rates from the slab is less than and not higher than 20 lbs/1,000 sf/24 hrs.



- b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 99% relative humidity level measurement.
  - c. If the vapor drive exceeds 99% relative humidity or 20 lbs/1,000 sf/24 hrs then the Owner's Representative and/or Engineer shall be notified and advised of additional cost for the possible installation of a vapor mitigation system that has been approved by the manufacturer or other means to lower the value to the acceptable limit.
- 3. Mechanical surface preparation
  - a. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 4-5 as described by the International Concrete Repair Institute.
  - b. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
  - c. Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum 1/4 inch key cut shall be made to properly seat the system, providing a smooth transition between areas. The detail cut shall also apply to drain perimeters and expansion joint edges.
  - d. Cracks and joints (non-moving) greater than 1/8 inch wide are to be chiseled or chipped-out and repaired per manufacturer's recommendations.
- 4. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufacturer's recommendations.
- 5. Plywood substrate preparation
  - a. The plywood substrate must be sound and nonflexing under the expected load. Typical plywood substrate must be exterior or marine grade, new, clean, and smooth finish (NO KNOTS). Plywood should be positively fastened to the existing surface with a high quality construction adhesive as well as a 6" screw pattern.

### 3.03 APPLICATION

#### A. General

- 1. The system shall be applied in five distinct steps as listed below:
  - a. Substrate preparation
  - b. Topping/overlay application with quartz aggregate broadcast.
  - c. Resin application with quartz aggregate broadcast.
  - d. Topcoat application
  - e. Second topcoat application.
- 2. Immediately prior to the application of any component of the system, the surface shall be dry and any remaining dust or loose particles shall be removed using a vacuum or clean, dry, oil-free compressed air.
- 3. The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the Manufacturer's recommendations.
- 4. The system shall follow the contour of the substrate unless pitching or other leveling work has been specified.
- 5. A neat finish with well-defined boundaries and straight edges shall be provided by the Applicator.

#### B. Topping

- 1. The topping shall be applied as a self-leveling system as specified by the Owner's Representative. The topping shall be applied in one lift with a nominal thickness of 1/8 inch.
- 2. The topping shall be comprised of three components, a resin, hardener and filler as supplied by the Manufacturer.

3. The hardener shall be added to the resin and thoroughly dispersed by suitably approved mechanical means. SL Aggregate shall then be added to the catalyzed mixture and mixed in a manner to achieve a homogenous blend.
  4. The topping shall be applied over horizontal surfaces using ½ inch “v” notched squeegee, trowels or other systems approved by the Manufacturer.
  5. Immediately upon placing, the topping shall be degassed with a loop roller.
  6. Quartz aggregate shall be broadcast to excess into the wet material at the rate of 0.8 lbs/sf.
  7. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.
- C. Broadcast
1. The broadcast coat resin shall be applied at the rate of 90 sf/gal (Q28) or 50 sf/gal (Q11).
  2. The broadcast coat shall be comprised of liquid components, combined at a ratio of 2 parts resin to 1 part hardener by volume and shall be thoroughly blended by mechanical means such as a high speed paddle mixer.
  3. Quartz aggregate shall be broadcast into the wet resin at the rate of 0.5 lbs/sf.
  4. Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.
- D. Grout coat
1. The grout coat shall be squeegee applied with a coverage rate of 90 sf/gal (Q28) or 50 sf/gal (Q11).
  2. The grout coat shall be comprised of liquid components, combined at a ratio of 2 parts resin to 1 part hardener by volume and shall be thoroughly blended by mechanical means such as a high speed paddle mixer.
  3. The grout coat will be back rolled and cross rolled to provide a uniform texture and finish.
- E. Topcoat
1. The topcoat shall be roller applied with a coverage rate of 500 sf/gal.
  2. The finished floor will have a nominal thickness of 1/4 inch.

### **3.04 FIELD QUALITY CONTROL**

- A. Tests, Inspection
1. The following tests shall be conducted by the Applicator:
    - a. Temperature
      - 1) Air, substrate temperatures and, if applicable, dew point.
    - b. Coverage Rates
      - 1) Rates for all layers shall be monitored by checking quantity of material used against the area covered.

### **3.05 CLEANING AND PROTECTION**

- A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.
- B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.

**END OF SECTION**

## **SECTION 09 6800**

### **CARPETING**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Carpet, stretched-in with cushion underlay.
- B. Accessories.

##### **1.02 REFERENCE STANDARDS**

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006 (Reapproved 2011).
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- C. CRI 104 - Standard for Installation of Commercial Carpet; Carpet and Rug Institute; 2015.
- D. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2009.
- E. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; Carpet and Rug Institute; Current Edition.
- F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2015.

##### **1.03 SUBMITTALS**

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- B. Samples: Submit two samples 12 by 12 inch in size illustrating color and pattern for each carpet and cushion material specified.
- C. Manufacturer's Installation Instructions: Indicate special procedures.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

##### **1.04 QUALITY ASSURANCE**

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

##### **1.05 FIELD CONDITIONS**

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.
- B. Maintain minimum 70 degrees F ambient temperature 24 hours prior to, during and 24 hours after installation.
- C. Ventilate installation area during installation and for 72 hours after installation.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Carpet:
  - 1. Interface, Inc: [www.interfaceinc.com](http://www.interfaceinc.com).
  - 2. J & J Industries, Inc: [www.jjindustries.com](http://www.jjindustries.com).
  - 3. Milliken & Company: [www.milliken.com](http://www.milliken.com).
  - 4. Or approved equal
- B. Cushion:
  - 1. FXI | Foam Innovation: [www.fx.com](http://www.fx.com).
  - 2. Leggett & Platt, Inc: [www.lpurethane.com](http://www.lpurethane.com).
  - 3. Or approved equal

## **2.02 CARPET**

- A. Carpet: Tufted, nylon.
  - 1. Basis of design: Milliken Illumine Lucent – Broadloom.
    - a. Critical Radiant Flux: Minimum of 0.45 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
    - b. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
    - c. Anti-microbial and stain resistant type
    - d. Minimum total thickness: 0.28"
    - e. Minimum total weight: 73 oz/sq yd.

## **2.03 CUSHION**

- A. Cushion: Rubber coated hair felt.
  - 1. Nominal Thickness: .360 inch.
  - 2. Roll Width: 54 inches.
  - 3. Density: 18 lb/cu ft.

## **2.04 ACCESSORIES**

- A. Tackless Strip: Carpet gripper, of type recommended by carpet manufacturer to suit application, with attachment devices.
- B. Moldings and Edge Strips: Embossed aluminum, color as selected.
- C. Adhesives - General: Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI Green Label certified.
- D. Seam Adhesive: Recommended by manufacturer.
- E. Contact Adhesive: Compatible with carpet material; releasable type.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive carpet.
- B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesives to sub floor surfaces.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and alkalinity (pH).
  - 1. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

### **3.02 PREPARATION**

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. Clean substrate.

### **3.03 INSTALLATION - GENERAL**

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet and cushion in accordance with manufacturer's instructions and CRI 104 (Commercial).
- C. Verify carpet match before cutting to ensure minimal variation between dye lots.
- D. Lay out carpet and locate seams in accordance with shop drawings.

1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic.
  2. Do not locate seams perpendicular through door openings.
  3. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
  4. Locate change of color or pattern between rooms under door centerline.
  5. Provide monolithic color, pattern, and texture match within any one area.
- E. Install carpet tight and flat on subfloor, well fastened at edges, with a uniform appearance.

#### **3.04 STRETCHED-IN CARPET**

- A. Install tackless strips with pins facing the wall around entire perimeter, except across door openings. Use edge strip where carpet terminates at other floor coverings.
- B. Space tackless strips slightly less than carpet thickness away from vertical surfaces, but not more than 3/8 inch.
- C. Install cushion in maximum size pieces using spot adhesive to adhere to sub-floor.
- D. Lay out cushion so that seams will be perpendicular to, or offset from, minimum 6 inches from carpet seams.
- E. Butt cushion edges together and tape seams.
- F. Trim cushion tight to edge of tackless strip and around projections and contours.
- G. Double cut carpet seams, with accurate pattern match. Make cuts straight, true, and unfrayed. Apply seam adhesive to all cut edges immediately.
- H. Join seams using hot adhesive tape. Form seams straight, not overlapped or peaked, and free of gaps.
- I. Following seaming, hook carpet onto tackless strip at one edge, power stretch, and hook firmly at other edges. Follow manufacturer's recommendations for method and amount of stretch.
- J. Trim carpet neatly at walls and around interruptions. Tuck edges into space between tackless strip and wall.

#### **3.05 CLEANING**

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

**END OF SECTION**

**SECTION 09 9000**  
**PAINTING AND COATING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints and stains.
- C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
  - 1. Note: Mechanical and Electrical:
    - a. In finished areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
    - b. Do not paint items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.

**1.02 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.
- D. SSPC (PM1) - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings; Fourth Edition.

**1.03 SUBMITTALS**

- A. Product Data: Provide complete list of all products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
  - 4. General product composition, properties and applicable data.
- B. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
- C. Manufacturer's Instructions: Indicate special surface preparation procedures.
- D. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.
- E. Maintenance Materials: Furnish the following for Owner's Representative's use in maintenance of project.
  - 1. Extra Paint and Coatings: 1 gallon of each color; store where directed.
  - 2. Label each container with color in addition to the manufacturer's label.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

## **1.06 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
- B. Provide all paint and coating products from the same manufacturer to the greatest extent possible.
- C. Paints:
  - 1. Benjamin Moore & Co: [www.benjaminmoore.com](http://www.benjaminmoore.com).
  - 2. Sherwin-Williams Company: [www.sherwin-williams.com](http://www.sherwin-williams.com).
  - 3. Behr Process Corporation: [www.behr.com](http://www.behr.com).
  - 4. Or Approved Equal
- D. Transparent Finishes / Stains:
  - 1. Sherwin-Williams Company: [www.sherwin-williams.com](http://www.sherwin-williams.com).
  - 2. Minwax, [www.minwax.com](http://www.minwax.com).
  - 3. Or approved equal..
- E. Primer Sealers: Same manufacturer as top coats.

### **2.02 PAINTS AND COATINGS - GENERAL**

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
  - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  - 2. Supply each coating material in quantity required to complete entire project's work from a single production run.
  - 3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
  - 1. Gypsum Board: Interior Latex Primer Sealer; MPI #50.
  - 2. Concrete: Same as top coats.
  - 3. Steel, Uncoated: Anti-Corrosive Alkyd Primer for Metal; MPI #79.
  - 4. Galvanized Steel: Interior Water Based Galvanized Primer; MPI #134.
- C. Volatile Organic Compound (VOC) Content:
  - 1. Provide coatings that comply with the most stringent requirements specified in the following:

- a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
- 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Colors: To be selected from manufacturer's full range of available colors.
  - 1. Selection to be made by Owner's Representative after award of contract.
  - 2. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

### **2.03 PAINT SYSTEMS - EXTERIOR**

- A. Paint WE-TR-VS - Wood, Transparent, Varnish, Stain:
  - 1. One coat of stain.
  - 2. One coat sealer.
- B. Paint ME-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
  - 1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
  - 2. Semi-gloss: Two coats of alkyd enamel.

### **2.04 PAINT SYSTEMS - INTERIOR**

- A. Paint I-OP-FL - Concrete and Wood Floors Indicated to be receive clear finish.
  - 1. Two coats primer and two top coats.
  - 2. Satin: MPI gloss level 4; use this sheen at all locations.
- B. Paint WI-TR-VS - Transparent Finish on Wood, Unless Otherwise Indicated:
  - 1. One coat of transparent stain.
  - 2. Two coats clear sealer.
- C. Paint MI-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
  - 1. Touch-up with alkyd primer.
  - 2. Semi-gloss: Two coats of alkyd enamel.
- D. Paint GI-OP-3LA - Gypsum Board, Latex-Acrylic, 3 Coat:
  - 1. One coat of alkyd primer sealer.
  - 2. Eggshell: Two coats of latex-acrylic enamel.

### **2.05 ACCESSORY MATERIALS**

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  - 1. Gypsum Wallboard: 12 percent.
  - 2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
  - 3. Exterior Wood: 19 percent, measured in accordance with ASTM D4442.
  - 4. Concrete Floors and Traffic Surfaces: 8 percent.



### **3.02 PREPARATION**

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- F. Concrete Floors and Traffic Surfaces to be Painted: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- G. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- H. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- I. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.
- J. Exterior Wood to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior calking compound after sealer has been applied. Prime concealed surfaces.

### **3.03 APPLICATION**

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's instructions.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance.
- E. Sand wood and metal surfaces lightly between coats to achieve required finish.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### **3.04 SCHEDULE - PAINT SYSTEMS**

- A. Concrete Floors: Finish all surfaces exposed to view.
  - 1. Interior: I-OP-FL
- B. Gypsum Board: Finish all surfaces exposed to view.
  - 1. Interior walls: GI-OP-3LA
- C. Wood: Finish all surfaces exposed to view.
  - 1. Exterior structural frame: Reference Section 06 1324 - Heavy Timber Framing

2. Exterior wood siding, trim, doors, soffits, railings, decks and 2x framing members: WE-TR-VS.
  3. Interior structural frame: Reference Section 06 1324 - Heavy Timber Framing
  4. Interior trim, door and window frames, and wood interior roof decking: WI-TR-VS.
  5. Interior Wood Floors: I-OP-FL
- D. Steel: Interior surfaces exposed to view, including mechanical elements: MI-OP-2A
- E. Steel: Exterior Surfaces exposed to view: ME-OP-2A

**END OF SECTION**

## **SECTION 10 1400**

### **SIGNAGE**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Room and door signs.
- B. Interior directional and informational signs.
- C. Emergency evacuation maps.

##### **1.02 REFERENCE STANDARDS**

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; International Code Council; 2009 (ANSI).

##### **1.03 SUBMITTALS**

- A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- B. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, other text to be applied, sign and letter sizes, fonts, and colors.
  - 1. When content of signs is indicated to be determined later, request such information from Owner's Representative at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
  - 2. Submit for approval by Owner's Representative prior to fabrication.
- C. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- D. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- E. Verification Samples: Submit samples showing colors specified, if requested.
- F. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

##### **1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Flat Signs: Type "REST", "DOOR", and "OCCU" on drawings
  - 1. M3 Signs +: [www.m3signsplus.com/](http://www.m3signsplus.com/)
  - 2. Fossil Industries; 1/2' thick exterior grade dHPL: [www.fossilinc.com](http://www.fossilinc.com).
  - 3. ASI Signage; Inform system: [www.asisignage.com](http://www.asisignage.com).
  - 4. Or Approved Equal.

##### **2.02 SIGNAGE APPLICATIONS**

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room, Restroom and Occupancy Signs: Refer to drawing sheet LS100 for sign locations.
  - 1. Sign Type: Flat signs with engraved panel media as specified.
  - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
  - 3. Character Height: 1 inch.

4. Sign Height: 2 inches, unless otherwise indicated.
  5. Rooms: Identify with room names and numbers to be determined later, not those shown on the drawings.
  6. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.
  7. Occupancy Signs: Coordinate requirements with local fire code.
- C. Interior Directional and Informational Signs:
1. Sign Type: Same as room and door signs.
  2. Allow for 4 wall mounted signs, 4 inches high by 16 inches long.
- D. Emergency Evacuation Maps:
1. Allow for one map per level, located adjacent to occupancy signs.
  2. Map content to be provided by Owner's Representative.
  3. Use clear plastic panel silk-screened on reverse, in brushed aluminum frame, screw-mounted.

### **2.03 SIGN TYPES**

- A. Flat Signs: Signage media without frame.
1. Panels: Graphics are to be manufactured as digital high pressure laminate, composed of several layers of phenolic resin impregnated kraft filler paper, a digitally imaged graphic, surfaced by layers of translucent exterior UV / graffiti overlay protection. Panels, including exterior overlays, are to be bonded under heat and extreme pressure to form a composite panel. All cutting and finishing to be performed by CNC router. Graphics to consist of full 12 color high definition printing technology.
  2. Include braille per requirements of ADA and ANSI standards.
  3. Wall Mounting of One-Sided Signs: Concealed screws.
- B. Color and Font: Unless otherwise indicated:
1. Character Font: Typeface as selected from the manufacturer's standard sans serif typefaces, upper case letters, minimum height 5/8", maximum height 2".
  2. Background Color: Color of Text and Raised Characters: To be selected from 73 standard colors.

### **2.04 ACCESSORIES**

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs where indicated:
1. Room and Door Signs: Locate on wall at latch side of door with centerline of sign at 60 inches above finished floor.
  2. If no location is indicated obtain Owner's Representative's instructions.
- D. Protect from damage until Substantial Completion; repair or replace damage items.

### **END OF SECTION**

**SECTION 10 2813**  
**TOILET AND BATH ACCESSORIES**

**PART 1 GENERAL**

**1.01 SUBMITTALS**

- A. Shop Drawings: Details for grab bars.
- B. Product Data: Specifications or data sheets and installation instructions for each product required.
- C. Contract Closeout Submittals: Furnish the following, as applicable, for each product required:
  - 1. Operation and maintenance data.
  - 2. Parts list.
  - 3. Keys and tools.

**1.02 QUALITY ASSURANCE**

- A. Provide products from more than one manufacturer if necessary to meet the requirements of this Section.

**1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store products in manufacturer's original protective packaging.
  - 1. Furnish items with protective wrappings or covers as required to protect finishes. Do not remove protective coverings until completion of other Work liable to damage accessory finish.
- B. Pack products with required trim, mounting devices, fasteners, service tools or keys, and complete installation instructions.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Stainless Steel: AISI Type 302/304 with No. 4 satin finish, unless otherwise indicated.
- B. Brass: Cast or forged quality alloy, FS WW-P-541D/GEN.
- C. Sheet Steel: Cold rolled, commercial quality, ASTM A 366.
  - 1. Galvanized: Zinc coated, ASTM A 123.
- D. Mounting Devices and Fasteners: Stainless steel, unless otherwise indicated.
- E. Chromium Plating: Nickel and chromium electro-deposited on metal; ASTM B 456, Type SC 2, satin finish unless otherwise indicated.

**2.02 FABRICATION**

- A. Fabricate stainless steel dispenser and disposal units of one-piece welded construction with seamless corners, unless otherwise specified.
- B. Equip units with keyed vandal-resistant lock where key access is specified.
- C. Mounting Devices: If not indicated, furnish type and size compatible with accessory unit specified which will securely mount accessory to wall or partition construction indicated.
  - 1. Grab Bars: Furnish anchoring devices which will withstand minimum downward pull of 500 pounds.
- D. Exposed Mounting Devices and Fasteners:
  - 1. Type: Theft-resistant.
  - 2. Finish: Match accessory finish, unless otherwise indicated.
  - 3. Concrete Construction: Furnish stainless steel machine screws in nonferrous expansion anchors except furnish stainless steel toggle bolts where anchorage occurs in concrete.

**2.03 KEYS AND TOOLS**

- A. Keys: Furnish minimum of 2 keys and an additional 2 keys for every 6 key operated accessories.
  - 1. Key similar key access units alike unless otherwise specified.

- B. Tools: Furnish socket wrenches compatible with set screws of concealed theft-resistant fastenings. Furnish minimum of 2 wrenches and an additional 2 wrenches for every 6 accessories having such fastenings.

#### **2.04 MIRRORS**

- A. Types:
  - 1. Bobrick B-165-2436, or approved equal.
  - 2. Type 430 stainless steel mirror channel frame with No. 1 quality 1/4" select float glass and 20 gauge galvanized steel concealed wall hanger.
- B. Size: Overall frame size 24 x 36 inches.

#### **2.05 SHELVES**

- A. Stainless Steel Shelf: 18 gage stainless steel one-piece top with minimum 1/2 inch return flange on all 4 sides and front hemmed; exposed 16 gage stainless steel angular gusset brackets with two 3/16 inch diameter mounting holes per bracket; all welded construction. Locate brackets 3 inches from each end of shelf. Furnish shelves 6 inches wide by 18 inches long unless otherwise indicated.

#### **2.06 DOUBLE ROLL TOILET TISSUE DISPENSERS - SURFACE MOUNTED (DRTTD-SM)**

- A. Combination double roll toilet tissue holder. . Unit shall have no sharp edges or corners. Fabricate double roll toilet tissue holder of 18-8 S, type-304, 22 gauge (0.8mm) stainless steel. All-welded construction. Exposed surfaces shall have satin finish. Holders shall accommodate up to 5 1/4" diameter rolls.

#### **2.07 GRAB BARS (GB)**

- A. Grab bar assemblies consisting of stainless steel tubing with integrally welded mounting flanges secured to concealed tenon plates with theft-resistant fasteners, and complying with the following requirements:
  - 1. Tubing: Stainless steel, 1-1/2 inch od x 18 gage wall thickness. Bend tubing at each end and join to flanges by concealed welding. Total projection from wall line (including bar diameter): 3 inches.
  - 2. Flanges: Stainless steel, 3 inch diameter, 11 gage wall thickness, not less than 1/2 inch deep.
  - 3. Finish: Brush satin finish, unless otherwise indicated.
  - 4. Finish On Grab Bars In Shower And Bathtub Areas: Striated non-slip polished finish in a continuous cross-hatched (diamond) pattern or shot peened non-slip finish, on entire bar surface exclusive of returns (ends).
  - 5. Tenon Plates: Stainless steel, 13 gage discs. Tenon plates shall be designed to allow plate location adjustment.
  - 6. Fasten grab bar flanges to tenon plates with not less than 3 concealed fasteners equally spaced around flange.

#### **2.08 SANITARY NAPKIN DISPOSAL UNIT:**

- A. Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.

#### **2.09 BABY CHANGING STATION-SURFACE MOUNTED**

- A. Baby changing station shall be FDA-approved blow-molded high-density polyethylene with Microban Antimicrobial additive interior. Bed shall be secured to back plate with a concealed, full-length steel-on-steel concealed hinge. Bed to have contoured changing area with a nylon safety strap and hooks for bags or purses. Unit shall comply with ADA regulations when installed.

#### **2.10 HEAVY DUTY CLOTHES HOOK WITH CONCEALED MOUNTING**

- A. Types:
  - 1. Bobrick B-2116, or approved equal.
  - 2. One-piece brass casting with satin nickel-plated finish. 300lb. downward pull strength.

## **2.11 COMBINATION UTILITY SHELF/MOP AND BROOM HOLDER**

- A. Provide in janitor's closet: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
  - 1. Drying rod: Stainless steel, 1/4 inch diameter.
  - 2. Hooks: 2, 0.06 inch stainless steel rag hooks at shelf front.
  - 3. Mop/broom holders: 3 spring-loaded rubber cam holders at shelf front.
  - 4. Length: 36 inches.
  - 5. Length: Manufacturer's standard length for number of holders/hooks.

## **2.12 ELECTRIC HAND DRYERS**

- A. Provide and install warm air, rapid drying electric hand dryers. Coordinate with EC for electrical connection.
  - 1. Warranty Period: 5 years; limited warranty.
  - 2. Controls: Automatic, activated by infrared optical sensor. Operates while hands are under blower. Shut-off within 2 seconds when hands removed or in 35 seconds if hands not removed.
  - 3. Cover: Stainless steel with brushed satin finish.
  - 4. Air Intake: Inlet openings on bottom of cover.
  - 5. Air Outlet: Delivers focused air stream at average hand position of 4 inches (102 mm) below air outlet.
  - 6. Noise Reduction Nozzle: 1.1 noise reduction nozzle.
  - 7. Wall Plate: Injection molded, rib reinforced plate with metal L brackets to attach cover, with ten 5/16 inch (8 mm) diameter holes for surface mounting to wall and three 7/8 inch (22 mm) diameter holes for electrical wiring; bottom hole suitable for surface conduit.
  - 8. Nominal Size: 11-3/4 inches (298 mm) wide by 12-11/16 inches (322 mm).
  - 9. Motor: 110V / 60 Hz / 15 Amps. Capacitor-initiated; brushless, for longer life and quiet operation; 1/10 HP, 3450 RPM; self-lubricating bearings, self-resetting thermal protection.
  - 10. Blower Fan: Single inlet centrifugal, 150 cubic feet per minute (0.071 cubic meters per second); mounted on motor shaft; insulated with resilient rubber mounting to obtain maximum sound and vibration dampening.
  - 11. Heater: Nichrome wire element, side mounted on blower housing to be vandal proof.
  - 12. Heater Safeguard: Automatic resetting thermostat to open when air flow is restricted and close when air flow is resumed.
  - 13. Air Temperature: 145 degrees F (63 degrees C).
  - 14. Drying Time: Less than 15 seconds.
  - 15. All metal parts coated according to Underwriters Laboratories, Inc. requirements.
  - 16. Mount dryers at heights indicated on Drawings.
  - 17. Design basis: Xlerator by Excel Dryer, or approved equal.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Unless otherwise indicated, install Work of this Section in strict accordance with the manufacturer's instructions.
  - 1. Install all attachments, anchorage devices, and fasteners as required to securely mount accessory units to types of wall or partition construction indicated.

### **3.02 CLEANING AND POLISHING**

- A. Remove protective wrappings from installed accessories after completion of other Work liable to damage accessory finish. Remove residue, if any, and polish exposed surfaces.

**END OF SECTION**

**SECTION 10 4400**  
**FIRE PROTECTION SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

**1.03 REFERENCE STANDARDS**

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.
- B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

**1.04 PERFORMANCE REQUIREMENTS**

- A. Conform to NFPA 10.
- B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc., for the purpose specified and indicated.

**1.05 SUBMITTALS**

- A. Shop Drawings: Indicate cabinet physical dimensions.
- B. Product Data: Provide materials and finish.
- C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

**1.06 FIELD CONDITIONS**

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Fire Extinguishers, cabinets and accessories:
  - 1. Ansul, a Tyco Business: [www.ansul.com](http://www.ansul.com).
  - 2. Larsen's Manufacturing Co: [www.larsensmfg.com](http://www.larsensmfg.com).
  - 3. JL Industries: [www.activarcpg.com](http://www.activarcpg.com)
  - 4. Or approved equal

**2.02 FIRE EXTINGUISHERS**

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
  - 1. Provide extinguishers labeled by UL for the purpose of the space indicated.
- B. Basis of Design: Gaseous Agent: "Cleanguard" by Anusul Incorporated
  - 1. Agent: DuPont FE-36
  - 2. Steel tank with pressure gauge
  - 3. Finish: powder coated with polyester urethane top coat
- C. Or approved equal.

**2.03 FIRE EXTINGUISHER CABINETS**

- A. Metal: Formed primed steel sheet; 0.036 inch thick base metal.



- B. Cabinet Configuration: Semi-recessed type.
  - 1. Sized to accommodate accessories.
  - 2. Trim: Flat face with minimum projection required to fit within wall without the addition of a chase.
- C. Door Glazing: Glass, clear, 1/8 inch thick tempered. Set in resilient channel gasket glazing.
- D. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.
- E. Weld, fill, and grind components smooth.
- F. Finish of Cabinet Exterior Trim and Door: No. 4.
- G. Finish of Cabinet Interior: White enamel.

#### **2.04 ACCESSORIES**

- A. Extinguisher Brackets: Formed steel, chrome-plated.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings, 18 inches from finished floor to inside bottom of cabinet.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.

**END OF SECTION**

## **SECTION 12 3600 COUNTERTOPS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Countertops for lobby desk.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 06 2000 - Finish Carpentry

#### **1.03 REFERENCE STANDARDS**

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- B. AWI (QCP) - Quality Certification Program, [www.awiqcp.org](http://www.awiqcp.org); current edition at [www.awiqcp.org](http://www.awiqcp.org).
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- D. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; International Surface Fabricators Association; 2013.
- E. PS 1 - Structural Plywood; 2009.

#### **1.04 SUBMITTALS**

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Specimen warranty.
- B. Shop Drawings: Complete details of materials and installation .
- C. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- D. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

#### **1.05 QUALITY ASSURANCE**

- A. Quality Certification: Provide AWI Quality Certification Program (QCP) inspection report and quality certification of completed work.
  - 1. Provide labels or certificates indicating that the work complies with requirements of AWI/AWMAC/WI (AWS) grade or grades specified.
  - 2. Prior to delivery to the site provide shop drawings with certification labels.
  - 3. Provide labels on each product when required by certification program.
  - 4. Upon completion of installation provide certificate certifying that the installation and products meet the specified requirements.
  - 5. Arrange and pay for inspections required for certification.
  - 6. Replace, repair, or rework all work for which certification is refused.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

### **PART 2 PRODUCTS**

#### **2.01 COUNTERTOP ASSEMBLIES**

- A. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
  - 1. Flat Sheet Thickness: 1/2 inch, minimum.
  - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and

capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.

- a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
  - b. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
  - c. Color and Pattern: As selected by Owner's Representative from manufacturer's full line.
  - d. Manufacturers:
    - 1) Dupont: [www.corian.com](http://www.corian.com).
    - 2) Formica Corporation: [www.formica.com](http://www.formica.com).
    - 3) Wilsonart, LLC: [www.wilsonart.com](http://www.wilsonart.com).
    - 4) Or Approved Equal
3. Other Components Thickness: 1/2 inch, minimum.
  4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge; use marine edge at sinks.

## **2.02 ACCESSORY MATERIALS**

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

## **2.03 FABRICATION**

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
  1. Join lengths of tops using best method recommended by manufacturer.
  2. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
  1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
  2. Height: 4 inches, unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Owner's Representative of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

### **3.02 TOLERANCES**

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

### **3.03 CLEANING AND PROTECTION**

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

### **END OF SECTION**

**SECTION 21 0500**  
**COMMON WORK RESULTS FOR FIRE SUPPRESSION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pipe, fittings, sleeves, escutcheons, seals, and connections for sprinkler, standpipe and fire hose, and combination sprinkler and standpipe systems.

**1.02 REFERENCE STANDARDS**

- A. ASME A112.18.1 - Plumbing Supply Fittings; The American Society of Mechanical Engineers; 2012.
- B. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; The American Society of Mechanical Engineers; 2013.
- C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; The American Society of Mechanical Engineers; 2010.
- D. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; The American Society of Mechanical Engineers; 2011.
- E. ASME B16.5 - Pipe Flanges and Flanged Fittings; The American Society of Mechanical Engineers; 2013 (ANSI/ASME B16.5).
- F. ASME B16.9 - Factory-made Wrought Steel Buttwelding Fittings; The American Society of Mechanical Engineers; 2012.
- G. ASME B16.11 - Forged Steel Fittings, Socket-welding and Threaded; The American Society of Mechanical Engineers; 2011.
- H. ASME B16.25 - Buttwelding Ends; The American Society of Mechanical Engineers; 2012.
- I. ASME B36.10M - Welded and Seamless Wrought Steel Pipe; The American Society of Mechanical Engineers; 2004.
- J. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).
- K. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- L. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe; 2009 (Reapproved 2014).
- M. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.
- N. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2009).
- O. ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use; 2013.
- P. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2011 w/Errata.
- Q. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; 2010 (ANSI/AWWA C105/A21.5).
- R. AWWA C606 - Grooved and Shouldered Joints; American Water Works Association; 2011 (ANSI/AWWA C606).
- S. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2016.
- T. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems; National Fire Protection Association; 2013.
- U. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

### **1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

### **1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing work of the type specified this section.
- B. Conform to UL and FM requirements.
- C. Valves: Bear UL label or marking. Provide manufacturer's name and pressure rating marked on valve body.

### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store valves in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

## **PART 2 PRODUCTS**

### **2.01 FIRE PROTECTION SYSTEMS**

- A. Sprinkler Systems: Conform to NFPA 13.
- B. Welding Materials and Procedures: Conform to ASME BPVC-IX.

### **2.02 BURIED PIPING**

- A. Steel Pipe: ASTM A53/A53M Schedule 40, ASTM A135/A135M Schedule 10, ASTM A795 Standard Weight, or ASME B36.10M Schedule 40, black, with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
  - 1. Steel Fittings: ASME B16.9, wrought steel, butt welded, ASME B16.25, butt weld ends, ASTM A234/A234M, wrought carbon steel or alloy steel, ASME B16.5, steel flanges and fittings, or ASME B16.11, forged steel socket welded and threaded; with double layer, half-lapped polyethylene tape.
  - 2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings.
  - 3. Joints: Welded in accordance with AWS D1.1/D.1M.

### **2.03 ABOVE GROUND PIPING**

- A. Steel Pipe: ASTM A53 Schedule 40, black & galvanized.
  - 1. Steel Fittings: ASME B16.25, butt weld ends.
  - 2. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
  - 3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

### **2.04 PIPE SLEEVES**

- A. Vertical Piping:
  - 1. Sleeve Length: 1 inch above finished floor.
  - 2. Provide sealant for watertight joint.
- B. Pipe Passing Through Below Grade Exterior Walls:
  - 1. Zinc coated or cast iron pipe.
  - 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.

### **2.05 ESCUTCHEONS**

- A. Material:
  - 1. Fabricate from nonferrous metal.
  - 2. Chrome-plated.
  - 3. Metals and Finish: Comply with ASME A112.18.

- B. Construction:
  - 1. One-piece for mounting on chrome-plated tubing or pipe and one-piece type elsewhere.
  - 2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

## **2.06 PIPE HANGERS AND SUPPORTS**

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
- C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- D. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
- E. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
- F. Vertical Support: Steel riser clamp.
- G. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

## **2.07 MECHANICAL COUPLINGS**

- A. Rigid Mechanical Couplings for Grooved Joints:
  - 1. Dimensions and Testing: Comply with AWWA C606.
  - 2. Minimum Working Pressure: 300 psig.
  - 3. Housing Material: Fabricate of ductile iron conforming to ASTM A536.
  - 4. Housing Coating: Factory applied orange enamel.
  - 5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
  - 6. Bolts and Nuts: Hot dipped galvanized or zinc electroplated steel

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
- B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- C. Install piping to conserve building space, to not interfere with use of space and other work.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Pipe Hangers and Supports:
  - 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  - 2. Place hangers within 12 inches of each horizontal elbow.
  - 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  - 4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
  - 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- H. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- I. Provide sleeves when penetrating footings, floors, walls, and partitions and seal pipe and sleeve penetrations to achieve fire resistance equivalent to fire separation required.
- J. Escutcheons:

1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
  2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
  3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
- K. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

### **3.02 SCHEDULE**

- A. Wet sprinkler system: Schedule 40 black steel.
- B. Dry sprinkler system: Schedule 40 galvanized steel.

### **3.03 CLEANING**

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

**END OF SECTION**

## **SECTION 21 0523**

### **GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Two-piece ball valves with indicators.
- B. Bronze butterfly valves with indicators.
- C. Iron butterfly valves with indicators.
- D. Check valves.
- E. Bronze OS&Y gate valves.
- F. NRS gate valves.
- G. Indicator posts.
- H. Trim and drain valves.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 21 0553 - Identification for Fire Suppression Piping and Equipment.
- B. Section 21 1300 - Fire Suppression Sprinklers.

##### **1.03 ABBREVIATIONS AND ACRONYMS**

- A. EPDM: Ethylene-propylene diene monomer.
- B. NRS: Non-rising stem.
- C. OS&Y: Outside screw and yoke.
- D. PTFE: Polytetrafluoroethylene.

##### **1.04 REFERENCE STANDARDS**

- A. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
- B. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2016.
- C. UL (DIR) - Online Certifications Directory; Underwriters Laboratories Inc.; current listings at [database.ul.com](http://database.ul.com).
- D. UL 262 - Gate Valves for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- E. UL 312 - Check Valves for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- F. UL 1091 - Butterfly Valves for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

##### **1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

##### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Prepare valves for shipping as follows:
  - 1. Protect internal parts against rust and corrosion.
  - 2. Protect threads and flange faces.
  - 3. Protect threads, flange faces, and weld ends.
  - 4. Set valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:
  - 1. Maintain valve end protection and protect flanges and specialties from dirt.
    - a. Provide temporary inlet and outlet caps.
    - b. Maintain caps in place until installation.
  - 2. Store valves in shipping containers and maintain in place until installation.



- a. Store valves indoors and maintain at higher than ambient dew point temperature.
  - b. If outdoor storage is unavoidable, store valves off the ground in watertight enclosures.
- C. Use the following precautions for handling:
  - 1. Do not use operating handles or stems as lifting or rigging points.

## **PART 2 PRODUCTS**

### **2.01 GENERAL REQUIREMENTS**

- A. UL Listed: Provide valves listed in UL's "Online Certifications Directory" under the following headings and bearing the UL mark:
  - 1. Main Level: HAMV - Fire Main Equipment.
    - a. Level 1: HCBZ - Indicator Posts, Gate Valve.
    - b. Level 1: HLOT - Valves.
    - c. Level 3: HLUG - Ball Valves, System Control.
    - d. Level 3: HLXS - Butterfly Valves.
    - e. Level 3: HMER - Check Valves.
    - f. Level 3: HMRZ - Gate Valves.
  - 2. Main Level: VDGT - Sprinkler System & Water Spray System Devices.
    - a. Level 1: VQGU - Valves, Trim, and Drain.
- B. FM Global Approved: Provide valves listed in FM P7825 Approval Guide under the following headings:
  - 1. Automated Sprinkler Systems:
    - a. Indicator posts.
    - b. Valves:
      - 1) Gate valves.
      - 2) Single check valves.
      - 3) Miscellaneous valves.
- C. Comply with NFPA 13 for valves.
- D. Valve Pressure Ratings: Not less than minimum pressure rating indicated or higher as required.
- E. Valve Sizes: Same as upstream piping unless otherwise indicated.

### **2.02 TWO-PIECE BALL VALVES WITH INDICATORS**

- A. UL 1091, except with ball instead of disc and FM Global standard for indicating valves (butterfly or ball type), Class Number 1112.
- B. Description:
  - 1. Minimum Pressure Rating: 175 psig.
  - 2. Body Design: Two piece.
  - 3. Body Material: Forged brass or bronze.
  - 4. Port Size: Full or standard.
  - 5. Seat: PTFE.
  - 6. Stem: Bronze or stainless steel.
  - 7. Ball: Chrome-plated brass.
  - 8. Actuator: Worm gear or traveling nut.

### **2.03 BRONZE BUTTERFLY VALVES WITH INDICATORS**

- A. UL 1091 and FM Global Approved for indicating valves, (butterfly or ball type), Class Number 1112.
- B. Minimum Pressure Rating: 175 psig.
- C. Body Material: Bronze.
- D. Seat: EPDM.
- E. Stem: Bronze or stainless steel.
- F. Disc: Bronze with EPDM coating.

- G. Actuator: Worm gear or traveling nut.
- H. Supervisory Switch: Internal or external.

#### **2.04 IRON BUTTERFLY VALVES WITH INDICATORS**

- A. UL 1091 and FM Global Approved for indicating valves (butterfly or ball type), Class Number 112.
- B. Minimum Pressure Rating: 175 psig.
- C. Body Material: Cast or ductile iron with nylon, EPDM, epoxy, or polyamide coating.
- D. Seat: EPDM.
- E. Stem: Stainless steel.
- F. Disc: Ductile iron, nickel plated.
- G. Actuator: Worm gear or traveling nut.
- H. Supervisory Switch: Internal or external.
- I. Body Design: Grooved-end connections.

#### **2.05 CHECK VALVES**

- A. UL 312 and FM Global Approved for check valves, Class Number 1045.
- B. Minimum Pressure Rating: 175 psig.
- C. Type: Center guided check valve.
- D. Body Material: Cast iron, ductile iron.
- E. Center guided check with elastomeric seal.
- F. Hinge Spring: Stainless steel.
- G. End Connections: Flanged, grooved, or threaded.

#### **2.06 BRONZE OS&Y GATE VALVES**

- A. UL 262 and FM Global Approved for fire-service water control valves (OS&Y and NRS-type gate valves).
- B. Minimum Pressure Rating: 175 psig.
- C. Body and Bonnet Material: Bronze or brass.
- D. Wedge: One-piece bronze or brass.
- E. Wedge Seat: Bronze.
- F. Stem: Bronze or brass.
- G. Packing: Non-asbestos PTFE.
- H. Supervisory Switch: External.
- I. End Connections: Threaded.

#### **2.07 NRS GATE VALVES**

- A. UL 262 and FM Global Approved for fire-service water control valves (OS&Y and NRS-type gate valves).
- B. Minimum Pressure Rating: 175 psig.
- C. Body and Bonnet Material: Cast or ductile iron.
- D. Wedge: Cast or ductile iron with elastomeric coating.
- E. Stem: Brass or bronze.
- F. Packing: Non-asbestos PTFE.
- G. Supervisory Switch: External.
- H. End Connections: Flanged.

## **2.08 INDICATOR POSTS**

- A. Type: Underground.
- B. Base Barrel Material: Cast or ductile iron.
- C. Cap: Cast or ductile iron.
- D. Operation: Wrench.

## **2.09 TRIM AND DRAIN VALVES**

- A. Ball Valves:
  - 1. Description:
    - a. Pressure Rating: 175 psig.
    - b. Body Design: Two piece.
    - c. Body Material: Forged brass or bronze.
    - d. Port Size: Full or standard.
    - e. Seat: PTFE.
    - f. Stem: Bronze or stainless steel.
    - g. Ball: Chrome-plated brass.
    - h. Actuator: Hand-lever.
- B. Angle Valves:
  - 1. Description:
    - a. Pressure Rating: 175 psig.
    - b. Body Material: Brass or bronze.
    - c. Ends: Threaded.
    - d. Stem: Bronze.
    - e. Disc: Bronze.
    - f. Packing: Asbestos free.
    - g. Handwheel: Malleable iron, bronze, or aluminum.
- C. Globe Valves:
  - 1. Description:
    - a. Pressure Rating: 175 psig.
    - b. Body Material: Bronze with integral seat and screw-in bonnet.
    - c. Ends: Threaded.
    - d. Stem: Bronze.
    - e. Disc Holder and Nut: Bronze.
    - f. Disc Seat: Nitrile.
    - g. Packing: Asbestos free.
    - h. Handwheel: Malleable iron, bronze, or aluminum.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Confirm valve interior to be free of foreign matter and corrosion.
- B. Remove packing materials.
- C. Examine guides and seats by operating valves from the fully open position to the fully closed position.
- D. Examine valve threads and mating pipe for form and cleanliness.
- E. Examine mating flange faces for conditions that might cause leakage.
  - 1. Check bolting for proper size, length, and material.
  - 2. Verify gasket for size, defects, damage, and suitable material composition for service.
  - 3. Replace all defective valves with new valves.

### **3.02 INSTALLATION**

- A. Comply with specific valve installation requirements and application in the following Sections:

1. Section 21 1300 for application of valves in wet and dry pipe, fire-suppression sprinkler systems.
- B. Install listed fire protection shutoff valves supervised-open, located to control sources of water supply except from fire department connections.
- C. Valves in horizontal piping installed with stem at or above the pipe center.
- D. Position valves to allow full stem movement.
- E. Install valve tags. Comply with Section 21 0553 requirements for valve tags, schedules, and signs on surfaces concealing valves; and the appropriate NFPA standard applying to the piping system in which valves are installed.

**END OF SECTION**

## **SECTION 21 0553**

### **IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Pipe markers.
- D. Ceiling tacks.

##### **1.02 REFERENCE STANDARDS**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007 (ANSI/ASME A13.1).
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

##### **1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Manufacturer's Installation Instructions: Indicate special procedures, and installation instructions.

#### **PART 2 PRODUCTS**

##### **2.01 IDENTIFICATION APPLICATIONS**

- A. Automatic Controls: Tags.
- B. Control Panels: Nameplates.
- C. Instrumentation: Tags.
- D. Major Control Components: Nameplates.
- E. Piping: Tags.
- F. Relays: Tags.
- G. Small-sized Equipment: Tags.
- H. Valves: Nameplates and ceiling tacks where above lay-in ceilings.

##### **2.02 NAMEPLATES**

- A. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: White.
  - 2. Letter Height: 1/4 inch.
  - 3. Background Color: Black.
  - 4. Thickness: 1/8 inch.
  - 5. Plastic: Conform to ASTM D709.

##### **2.03 TAGS**

- A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

##### **2.04 PIPE MARKERS**

- A. Color: Conform to ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C. Color code as follows:
  - 1. Fire Quenching Fluids: Red with white letters.

## **2.05 CEILING TACKS**

- A. Description: Steel with 3/4 inch diameter color coded head.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.

### **3.02 INSTALLATION**

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Locate ceiling tacks to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

**END OF SECTION**

**SECTION 21 1300**  
**FIRE SUPPRESSION SPRINKLERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wet-pipe sprinkler system.
- B. Dry-pipe sprinkler system.
- C. System design, installation, and certification.
- D. Fire department connections.

**1.02 RELATED REQUIREMENTS**

- A. Section 22 0548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

**1.03 REFERENCE STANDARDS**

- A. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2012.
- B. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.
- C. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2013.
- D. NFPA 13 - Standard for the Installation of Sprinkler Systems; National Fire Protection Association; 2016.
- E. NFPA 1963 - Standard for Fire Hose Connections; National Fire Protection Association; 2014.
- F. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.
- G. UL 405 - Fire Department Connection Devices; Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Shop Drawings:
  - 1. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
- D. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.
- E. 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 Sprinklers: Type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
  - 3. Sprinkler Wrenches: For each sprinkler type.

**1.05 QUALITY ASSURANCE**

- A. Conform to UL requirements.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Sprinklers, Valves, and Equipment:

1. Tyco Fire Protection Products, a Tyco Business: [www.tyco-fire.com](http://www.tyco-fire.com).
2. Viking Corporation: [www.vikinggroupinc.com](http://www.vikinggroupinc.com).
3. Reliable Automatic Sprinkler Co..

## **2.02 SPRINKLER SYSTEM**

- A. Sprinkler System: Provide coverage for entire building.
- B. Occupancy: Light hazard; comply with NFPA 13.
- C. Water Supply: Determine volume and pressure from water flow test data.
- D. Provide fire department connections where indicated.
- E. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.
- F. Pipe Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
  1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
  2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
  3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
  4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
  5. Other Types: As required.

## **2.03 SPRINKLERS**

- A. Suspended Ceiling Type: Recessed pendant type with matching push on escutcheon plate.
  1. Response Type: Quick.
  2. Coverage Type: Standard.
  3. Escutcheon Plate Finish: Enamel, color by architect.
  4. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- B. Exposed Area Type: Upright type with guard where necessary.
  1. Response Type: Quick.
  2. Coverage Type: Standard.
  3. Finish: Brass.
  4. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- C. Sidewall Type: Semi-recessed horizontal sidewall type with matching push on escutcheon plate.
  1. Response Type: Quick.
  2. Coverage Type: Standard.
  3. Finish: Chrome plated.
  4. Escutcheon Plate Finish: Chrome plated.
  5. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

## **2.04 PIPING SPECIALTIES**

- A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
  1. Activate electric alarm.
  2. Test and drain valve.
  3. Replaceable internal components without removing valve from installed position.
- B. Dry Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm, accelerator, and with the following additional capabilities and features:
  1. Activate electric alarm.
  2. Test and drain valve.
  3. Replaceable internal components without removing valve from installed position.
- C. Backflow Preventer: Reduced pressure principle valve assembly backflow preventer with drain and OS & Y gate valve on each end.
- D. Test Connections:



- E. Water Motor Alarm: Hydraulically operated impeller type alarm with aluminum alloy chrome plated gong and motor housing, nylon bearings, and inlet strainer.
- F. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.
- G. Fire Department Connections:
  - 1. Type: Free standing made of corrosion resistant metal complying with UL 405.
  - 2. Inlets: Two way, 2-1/2 inch swivel fittings, internal threaded. Thread size and inlets according to NFPA 1963 or Authority Having Jurisdiction. Brass caps with gaskets, chains, and lugs.
  - 3. Sleeve: Brass, 18 inches height.

## **2.05 AIR COMPRESSOR**

- A. Compressor: Riser mounted, single unit, electric motor driven, motor, motor starter, safety valves, check valves, air maintenance device incorporating electric pressure switch and unloader valve.
- B. Electrical Characteristics:
  - 1. 115 volts, single phase, 60 Hz, 6.4 Amps.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with referenced NFPA design and installation standard.
- B. Install equipment in accordance with manufacturer's instructions.
- C. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent siamese connectors to allow full swing of fire department wrench handle.
- D. Locate outside alarm gong on building wall as indicated.
- E. Place pipe runs to minimize obstruction to other work.
- F. Place piping in concealed spaces above finished ceilings.
- G. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
- H. Install air compressor on vibration isolators. Refer to Section 22 0548.
- I. Flush entire piping system of foreign matter.
- J. Hydrostatically test entire system.
- K. Require test be witnessed by Fire Marshal.

### **3.02 INTERFACE WITH OTHER PRODUCTS**

- A. Ensure required devices are installed and connected as required to fire alarm system.

**END OF SECTION**

## **SECTION 22 0513**

### **COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Single phase electric motors.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

##### **1.03 REFERENCE STANDARDS**

- A. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2014.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

##### **1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.

##### **1.05 QUALITY ASSURANCE**

- A. Conform to NFPA 70.

##### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

#### **PART 2 PRODUCTS**

##### **2.01 GENERAL CONSTRUCTION AND REQUIREMENTS**

- A. Electrical Service:
  - 1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.
- B. Construction:
  - 1. Open drip-proof type except where specifically noted otherwise.
  - 2. Design for continuous operation in 40 degrees C environment.
  - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- D. Wiring Terminations:
  - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
  - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

##### **2.02 APPLICATIONS**

- A. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.

#### **PART 3 EXECUTION**

##### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.

- C. Check line voltage and phase and ensure agreement with nameplate.

**END OF SECTION**

## **SECTION 22 0548**

### **VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Equipment support bases.
- B. Vibration isolators.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete.

##### **1.03 REFERENCE STANDARDS**

- A. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2011.

##### **1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Manufacturer's Instructions: Indicate installation instructions with special procedures and setting dimensions.

##### **1.05 QUALITY ASSURANCE**

- A. Perform design and installation in accordance with applicable codes.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

#### **PART 2 PRODUCTS**

##### **2.01 PERFORMANCE REQUIREMENTS**

- A. General:
  - 1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.

##### **2.02 EQUIPMENT SUPPORT BASES**

- A. Concrete Inertia Bases:
  - 1. Construction: Engineered, steel forms, with integrated isolator brackets and anchor bolts, welded or tied reinforcing bars running both ways in a single layer.
  - 2. Size: 4 inches minimum depth and sized to accommodate elbow supports.
  - 3. Mass: Minimum of 1.5 times weight of isolated equipment.
  - 4. Connecting Point: Reinforced to connect isolators and snubbers to base including template and fastening devices for equipment.
  - 5. Concrete: Filled on site with minimum 3000 psi concrete. See Section 03 3000 for additional requirements.

##### **2.03 VIBRATION ISOLATORS**

- A. Non-Seismic Type:
  - 1. All Elastomeric-Fiber Glass Pads:
    - a. Configuration: Flat or molded.
    - b. Thickness: 0.25 inch minimum.
    - c. Assembly: Single or multiple layers using bonded, galvanized sheet metal separation plate between each layer with load plate providing evenly distributed load over pad surface.
  - 2. Elastomeric Mounts:
    - a. Material: Oil, ozone, and oxidant resistant compounds.
    - b. Assembly: Encapsulated load transfer plate bolted to equipment and base plate with anchor hole bolted to supporting structure.
  - 3. Steel Springs:

- a. Assembly: Freestanding, laterally stable without housing.
  - b. Leveling Device: Rigidly connected to equipment or frame.
- 4. Restrained Steel Springs:
  - a. Housing: Rigid blocking during rigging prevents equipment installed and operating height from changing during temporary weight reduction.
  - b. Equipment Wind Loading: Adequate means for fastening isolator top to equipment and isolator base plate to supporting structure.
- 5. Elastomeric Hangers:
  - a. Housing: Steel construction containing elastomeric isolation element to prevent rod contact with housing and short-circuiting of isolating function.
  - b. Incorporate steel load distribution plate sandwiching elastomeric element to housing.
- 6. Spring Hanger:
  - a. Housing: Steel construction containing stable steel spring and integral elastomeric element preventing metal to metal contact.
  - b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.
- 7. Combination Elastomeric-Spring Hanger:
  - a. Housing: Steel construction containing stable steel spring with elastomeric element in series isolating upper connection of hanger box to building structure.
  - b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.
- 8. Thrust Restraints:
  - a. Housing: Steel construction containing stable steel spring and integral elastomeric element installed in pairs to resist air pressure thrusts.
  - b. Bottom Openings: Sized to allow plus/minus 15 degrees rod misalignment.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION - GENERAL**

- A. Install in accordance with manufacturer's instructions.
- B. Bases:
  - 1. Set concrete inertia bases for 2 inches clearance between housekeeping pad and base.
  - 2. Adjust equipment level.
- C. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.
- D. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.
- E. Support piping connections to equipment mounted on isolators using isolators or resilient hangers for scheduled distance.
  - 1. Up to 4 Inches Pipe Size: First three points of support.

#### **3.02 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect isolated equipment after installation and submit report. Include static deflections.

**END OF SECTION**

## **SECTION 22 0553**

### **IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Pipe Markers.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 09 9123 - Interior Painting: Identification painting.

##### **1.03 REFERENCE STANDARDS**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

##### **1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

#### **PART 2 PRODUCTS**

##### **2.01 IDENTIFICATION APPLICATIONS**

- A. Piping: Tags.
- B. Small-sized Equipment: Tags.
- C. Tanks: Nameplates.
- D. Valves: Tags and ceiling tacks where located above lay-in ceiling.

##### **2.02 NAMEPLATES**

- A. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: White.
  - 2. Letter Height: 1/4 inch.
  - 3. Background Color: Black.
  - 4. Plastic: Conform to ASTM D709.
  - 5. \_\_\_\_\_.

##### **2.03 TAGS**

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

##### **2.04 PIPE MARKERS**

- A. Comply with ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

- E. Color code as follows:
  - 1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.
  - 2. Flammable Fluids: Yellow with black letters.

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 9123 for stencil painting.

#### **3.02 INSTALLATION**

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Apply stencil painting in accordance with Section 09 9123.
- D. Install plastic pipe markers in accordance with manufacturer's instructions.
- E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- G. Use tags on piping 3/4 inch diameter and smaller.
  - 1. Identify service, flow direction, and pressure.
  - 2. Install in clear view and align with axis of piping.
  - 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

**END OF SECTION**

**SECTION 22 0719**  
**PLUMBING PIPING INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Piping insulation.
- B. Jackets and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 8400 - Firestopping.
- B. Section 22 1005 - Plumbing Piping: Placement of hangers and hanger inserts.

**1.03 REFERENCE STANDARDS**

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus; 2013.
- B. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- C. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. 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 not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

**1.07 FIELD CONDITIONS**

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

**PART 2 PRODUCTS**

**2.01 REGULATORY REQUIREMENTS**

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

**2.02 GLASS FIBER**

- A. Manufacturers:
  - 1. Johns Manville Corporation; \_\_\_\_\_: [www.jm.com](http://www.jm.com).
  - 2. Knauf Insulation; \_\_\_\_\_: [www.knaufusa.com](http://www.knaufusa.com).
  - 3. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ: [www.ocbuildingspec.com](http://www.ocbuildingspec.com).



- B. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
  - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
  - 2. Maximum Service Temperature: 650 degrees F.
  - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

## 2.03 JACKETS

- A. PVC Plastic.
  - 1. Manufacturers:
    - a. Johns Manville Corporation; \_\_\_\_\_: [www.jm.com](http://www.jm.com).
    - b. Substitutions: See Section 01 6000 - Product Requirements.
  - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
    - a. Minimum Service Temperature: 0 degrees F.
    - b. Maximum Service Temperature: 150 degrees F.
    - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
    - d. Thickness: 10 mil.
    - e. Connections: Brush on welding adhesive.
  - 3. Covering Adhesive Mastic: Compatible with insulation.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
  - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
  - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. Glass fiber insulated pipes conveying fluids above ambient temperature:
  - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
  - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- H. Inserts and Shields:
  - 1. Application: Piping 1-1/2 inches diameter or larger.
  - 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
  - 3. Insert Location: Between support shield and piping and under the finish jacket.
  - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
  - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

- I. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.
- J. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting.
- K. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

### **3.02 SCHEDULES**

- A. Plumbing Systems:
  - 1. Domestic Hot Water Supply:
    - a. Glass Fiber Insulation:
      - 1) Thickness: 1 inch.

**END OF SECTION**

**SECTION 22 1005**  
**PLUMBING PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pipe, pipe fittings, valves, and connections for piping systems.
  - 1. Sanitary sewer.
  - 2. Domestic water.
  - 3. Gas.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 8400 - Firestopping.
- B. Section 08 3100 - Access Doors and Panels.
- C. Section 09 9113 - Exterior Painting.
- D. Section 09 9123 - Interior Painting.
- E. Section 22 0516 - Expansion Fittings and Loops for Plumbing Piping.
- F. Section 22 0548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
- G. Section 22 0553 - Identification for Plumbing Piping and Equipment.
- H. Section 22 0719 - Plumbing Piping Insulation.
- I. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.
- J. Section 31 2316 - Excavation.
- K. Section 31 2316.13 - Trenching.
- L. Section 31 2323 - Fill.

**1.03 REFERENCE STANDARDS**

- A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; 1999, and addenda A&B (R2004).
- B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; The American Society of Mechanical Engineers; 2011.
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012 (ANSI B16.18).
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; The American Society of Mechanical Engineers; 2013.
- E. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV; The American Society of Mechanical Engineers; 2011.
- F. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV; The American Society of Mechanical Engineers; 2012.
- G. ASME B31.1 - Power Piping; The American Society of Mechanical Engineers; 2014 (ANSI/ASME B31.1).
- H. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers; 2014 (ANSI/ASME B31.9).
- I. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; The American Society of Mechanical Engineers; 2013.
- J. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- K. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2015.
- L. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.

- M. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- N. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2010.
- O. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.
- P. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
- Q. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2013.
- R. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2010.
- S. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2002 (Reapproved 2010).
- T. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2014.
- U. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012.
- V. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.
- W. ASTM D2846/D2846M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems; 2009b.
- X. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).
- Y. ASTM F437 - Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2009.
- Z. ASTM F438 - Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40; 2015.
- AA. ASTM F439 - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2013.
- AB. ASTM F441/F441M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80; 2013.
- AC. ASTM F442/F442M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR); 2013.
- AD. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings; 2014.
- AE. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2011-AMD 1.
- AF. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; 2010 (ANSI/AWWA C105/A21.5).
- AG. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; Cast Iron Soil Pipe Institute; 2009.
- AH. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; Cast Iron Soil Pipe Institute; 2011
- AI. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.
- AJ. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).
- AK. NSF 372 - Drinking Water System Components - Lead Content; 2011.

#### **1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

### **1.05 QUALITY ASSURANCE**

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.
- D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
- E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

### **1.07 FIELD CONDITIONS**

- A. Do not install underground piping when bedding is wet or frozen.

## **PART 2 PRODUCTS**

### **2.01 GENERAL REQUIREMENTS**

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

### **2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING**

- A. Cast Iron Pipe: ASTM A74 service weight.
  - 1. Fittings: Cast iron.
  - 2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
- B. Cast Iron Pipe: CISPI 301, hubless.
  - 1. Fittings: Cast iron.
  - 2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.

### **2.03 SANITARY SEWER PIPING, ABOVE GRADE**

- A. Cast Iron Pipe: ASTM A74, service weight.
  - 1. Fittings: Cast iron.
  - 2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.
- B. Cast Iron Pipe: CISPI 301, hubless, service weight.
  - 1. Fittings: Cast iron.
  - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- C. Copper Tube: ASTM B306, DWV.
  - 1. Fittings: ASME B16.29, wrought copper, or ASME B16.23, solvent.
  - 2. Joints: ASTM B32, alloy Sn50 solder.
- D. PVC Pipe: ASTM D2665.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

### **2.04 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING**

- A. Copper Pipe: ASTM B42, light drawn.

1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
2. Joints: AWS A5.8M/A5.8, BCuP copper/silver braze.

## **2.05 DOMESTIC WATER PIPING, ABOVE GRADE**

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
  1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
  2. Joints: ASTM B32, alloy Sn95 solder.
- B. CPVC Pipe: ASTM D2846/D2846M, ASTM F441/F441M, or ASTM F442/F442M.
  1. Fittings: CPVC; ASTM D2846/D2846M, ASTM F437, ASTM F438, or ASTM F439.
  2. Joints: ASTM D2846/D2846M, solvent weld with ASTM F493 solvent cement.
  3. Design Basis for pipe & fittings: Flowguard Gold with no exceptions.

## **2.06 NATURAL GAS PIPING, BURIED WITHIN 5 FEET OF BUILDING**

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
  1. Fittings: ASTM A234/A234M, wrought steel welding type.
  2. Joints: ASME B31.1, welded.
  3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.

## **2.07 NATURAL GAS PIPING, ABOVE GRADE**

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
  1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
  2. Joints: Threaded or welded to ASME B31.1.

## **2.08 FLANGES, UNIONS, AND COUPLINGS**

- A. Unions for Pipe Sizes 3 Inches and Under:
  1. Ferrous pipe: Class 150 malleable iron threaded unions.
  2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Size Over 1 Inch:
  1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
  2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

## **2.09 PIPE HANGERS AND SUPPORTS**

- A. Provide hangers and supports that comply with MSS SP-58.
  1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
  2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
  3. Trapeze Hangers: Welded steel channel frames attached to structure.
  4. Vertical Pipe Support: Steel riser clamp.
- B. Plumbing Piping - Drain, Waste, and Vent:
  1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
  2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  4. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
  5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Plumbing Piping - Water:

1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
  2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  4. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
  5. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
1. Other Types: As required.

## **2.10 BALL VALVES**

- A. For copper tube: Construction, 2 Inches and Smaller: MSS SP-110, NSF/ANSI 61 and 372 listed, 600 psi CWP, bronze alloy body, type 316 stainless steel ball, full port, teflon seats and stuffing box ring, blow-out proof stem, stainless steel trim, lever handle, solder ends.
- B. For CPVC tube: Construction: 4 inches and smaller. CPVC construction, cell class 23447 per ASTM D1784; NSF/ANSI 61 listed; full port; socket connections to piping; union connection to valve; operating pressure must exceed 160 psi at 140 degree F.

## **2.11 PLUG VALVES**

- A. Construction 2-1/2 Inches and Larger: MSS SP-78, 175 psi CWP, cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged ends. Provide lever operator with set screw.

## **2.12 GAS PRESSURE REGULATOR**

- A. Gas Pressure Regulator (GPR-1):
  1. Construction:
    - a. Body: Steel.
    - b. Spring Case and Spring Case Extension: Steel.
    - c. Disk Plate Assembly Seating Surface: Nitrile.
    - d. Diaphragm cases, diaphragm plates, bottom flange, springs, and bolting: Plated steel.
    - e. Diaphragm spacer: zinc-plated steel.
    - f. Diaphragms, Valve plug O-ring, and Spring Case Gasket: Nitrile.
    - g. Bottom Flange and Stem Gaskets: Composition.
    - h. Diaphragm case and closing cap gaskets: Neoprene
    - i. Pitot Tube: Stainless Steel.
    - j. Sealing washer: Carbon steel.
    - k. Standard vent assembly: Zinc/Stainless Steel.
    - l. Snap Ring: Bronze.
    - m. Closing Ring and Type 66 Adjusting Screw and Spring Seats: Zinc.
    - n. Flapper Valve, Break adjustment screw, spring retainer, and spring case coupling: Brass.
    - o. Orifice/Metal Seat Parts: Brass.
  2. Pressure setting adjustment: Adjusting Screw.
  3. Pressure Registration: External.
  4. Control Line: 3/4" NPT.
  5. Spring Case Vent: 3/4" NPT with removable assembly.
  6. See schedule on Drawings for inlet pressures, outlet pressures, and required capacities.
- B. Manufacturers:

## **2.13 FLOW CONTROLS**

- A. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- B. Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

## **2.14 CHECK VALVES**

- A. For copper tube up to 2 Inches:
  - 1. MSS SP-139, 200 psi CWP, bronze alloy construction conforming to NSF/ANSI-61-8 and 372, solder ends.

## **2.15 GAS PIPE TRANSITION RISER**

- A. Gas Pipe Transition Riser: Anodeless service riser providing easy to install method for making polyethylene-to-steel transitions. The underground portion of the riser casing shall be equipped with a combination moisture seal/shear protection fitting. Risers shall be tested to 150 psi. The gas-carrying steel pipe nipple meets the requirements of A53 pipe. The riser shall meet or exceed ASTM D-2513 Category 1, ANSI B 1.20, USDOT Part 192 and CSAB137.4. Design based on Perfection Inc.:

## **2.16 WATER PRESSURE REDUCING VALVES**

- A. Pressure Reducing Valve (PRV-1): Galvanized cast iron body with flanged connections, replaceable stainless steel seat, reinforced Buna-N diaphragm, EPDM disk, and stainless steel piston.
  - 1. Construction:
    - a. Body: Iron coated with corrosion-resistant cold galvanizing.
    - b. Seat: Replaceable stainless steel.
    - c. Diaphragm: Reinforced Buna-N.
    - d. Disc: EPDM.
    - e. Piston: Stainless steel.
  - 2. Pressure and Temperature Characteristics
    - a. Temperature Range: 33-160 degrees F
    - b. Maximum Working Pressure: 175 psi.
    - c. Adjustable Reduced Pressure Range: 25-75 psi.
    - d. Project pressure setting 65 psi.
  - 3. Capacities:
    - a. 2.5 psi drop at 40 gpm.
    - b. 6.5 psi drop at 80 gpm.
    - c. 10 psi drop at 120 gpm.
    - d. 18 psi drop at 200 gpm.
- B. Manufacturers:

## **2.17 RELIEF VALVES**

- A. Pressure Relief:
  - 1. ANSI Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.

## **2.18 STRAINERS**

- A. Size 1-1/2 inch to 4 inch:
  - 1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that excavations are to required grade, dry, and not over-excavated.

### **3.02 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.



- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 0516.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
- I. Install vent piping penetrating roofed areas to maintain integrity of roof assembly; refer to Section \_\_\_\_.
- J. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- K. Install water piping to ASME B31.9.
- L. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- M. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- N. Sleeve pipes passing through partitions, walls and floors.
- O. Inserts:
  - 1. Provide inserts for placement in concrete formwork.
- P. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.9.
  - 2. Support horizontal piping as scheduled.
  - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  - 4. Place hangers within 12 inches of each horizontal elbow.
  - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
  - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 8. Provide copper plated hangers and supports for copper piping.
  - 9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
  - 10. Provide hangers adjacent to motor driven equipment with vibration isolation; refer to Section 22 0548.
  - 11. Support cast iron drainage piping at every joint.

### **3.04 APPLICATION**

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- D. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install ball valves for throttling, bypass, or manual flow control services.
- F. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.
- G. Provide spring loaded check valves on discharge of water pumps.

- H. Provide plug valves in natural gas systems for shut-off service.
- I. Provide flow controls in water recirculating systems where indicated.

### **3.05 TOLERANCES**

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

### **3.06 SERVICE CONNECTIONS**

- A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.
  - 1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Calk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.
  - 2. Provide 18 gage, 0.0478 inch galvanized sheet metal sleeve around service main to 6 inch above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.

### **3.07 SCHEDULES**

- A. Pipe Hanger Spacing:
  - 1. Metal Piping:
    - a. Pipe size: 1-1/2 inches to 2 inches:
      - 1) Maximum hanger spacing: 10 ft.
      - 2) Hanger rod diameter: 3/8 inch.
    - b. Pipe size: 2-1/2 inches to 3 inches:
      - 1) Maximum hanger spacing: 10 ft.
      - 2) Hanger rod diameter: 1/2 inch.
    - c. Pipe size: 4 inches to 6 inches:
      - 1) Maximum hanger spacing: 10 ft.
      - 2) Hanger rod diameter: 5/8 inch.
  - 2. Plastic Piping:
    - a. All Sizes:
      - 1) Maximum hanger spacing: 6 ft.
      - 2) Hanger rod diameter: 3/8 inch.

**END OF SECTION**

**SECTION 22 1006**  
**PLUMBING PIPING SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Floor drains.
- B. Cleanouts.
- C. Hose bibbs.
- D. Hydrants.
- E. Pressure Reducing Valve
- F. Reduced pressure zone assemblies.
- G. Water hammer arrestors.
- H. Sumps and interceptors.
- I. Mixing valves.

**1.02 RELATED REQUIREMENTS**

- A. Section 22 1005 - Plumbing Piping.
- B. Section 22 4000 - Plumbing Fixtures.
- C. Section 22 3000 - Plumbing Equipment.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASME A112.6.3 - Floor and Trench Drains; The American Society of Mechanical Engineers; 2001 (R2007).
- C. ASSE 1011 - Hose Connection Vacuum Breakers; American Society of Sanitary Engineering; 2004 (ANSI/ASSE 1011).
- D. ASSE 1012 - Backflow Preventer with Intermediate Atmospheric Vent; American Society of Sanitary Engineering; 2009 (ANSI/ASSE 1012).
- E. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).
- F. NSF 372 - Drinking Water System Components - Lead Content; 2011.
- G. PDI-WH 201 - Water Hammer Arresters; Plumbing and Drainage Institute; 2010.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Accept specialties on site in original factory packaging. Inspect for damage.

**PART 2 PRODUCTS**

**2.01 GENERAL REQUIREMENTS**

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

## **2.02 DRAINS**

- A. Floor Drain (FD-1): ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.

## **2.03 CLEANOUTS**

- A. Cleanouts at Interior Finished Floor Areas (FCO-1):
  - 1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.

## **2.04 HOSE BIBBS**

- A. Interior Mixing Type Hose Bibbs (Non Freeze): ASSE 1019; freeze resistant, self-draining type with polished bronze lockable recessed box hose thread spout, lockshield and removable key, and integral vacuum breaker.

## **2.05 PRESSURE REDUCING VALVE**

- A. A Lead Free Water Pressure Reducing Valve shall be installed on the water service pipe near its entrance to the building where supply main pressure exceeds 60psi (413 kPa) to reduce it to 50psi (345 kPa) or lower. The water pressure reducing valve shall be constructed using Lead Free\* materials. Lead Free\* regulators shall comply with state codes and standards, where applicable, requiring reduced lead content. Sill cocks and outside wall hydrants may be left on full main pressure at the option of the owner. Provision shall be made to permit the bypass flow of water back through the valve into the main when pressures, due to thermal expansion on the outlet side of the valve, exceed the pressure in the main supply. Pressure reducing valves with built in bypass check valves and strainer will be acceptable. Approved valves shall comply with ASSE 1003. Valve shall be a Watts Series LF223 or LF223S (with strainer).

## **2.06 REDUCED PRESSURE ZONE ASSEMBLIES**

- A. Manufacturers:
  - 1. Watts Regulator Company, a part of Watts Water Technologies; \_\_\_\_\_: [www.wattsregulator.com](http://www.wattsregulator.com).
- B. Reduced pressure Zone Assembly:
  - 1. A Reduced Pressure Zone Assembly shall be installed at each cross-connection to prevent backsiphonage and backpressure of hazardous materials into the potable water supply. The assembly shall consist of a pressure differential relief valve located in a zone between two positive seating check valves. Backsiphonage protection shall include provision to admit air directly into the reduced pressure zone via a separate channel from the water discharge channel, or directly into the supply pipe via a separate vent. The assembly shall be constructed using Lead Free\* cast copper silicon materials. The Lead Free\* reduced pressure zone assembly shall comply with state codes and standards, where applicable, requiring reduced lead content. The assembly shall include two tightly closing shutoff valves before and after the assembly, test cocks and a protective strainer upstream of the No. 1 shutoff valve. The assembly (specify Model LF909 for temperatures up to 140°F (60°C) or Model LF909HW for temperatures up to 210°F (99°C)) shall meet the requirements of ASSE Std. 1013; AWWA Std. C-511-92 CSA B64.4; FCCCHR of USC Manual Section 10. Listed by IAPMO (UPC). SBCCI (Standard Plumbing code). The assembly shall be a Watts LF909QTS or LF909QTSHW.

## **2.07 WATER HAMMER ARRESTORS**

- A. Water Hammer Arrestors:
  - 1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range -100 to 300 degrees F and maximum 250 psi working pressure.

## **2.08 SUMP AND INTERCEPTORS**

- A. Sediment Interceptors:

1. Epoxy coated cast iron body and secured cover with removable stainless steel sediment bucket.

## **2.09 MIXING VALVES**

- A. Point of Use Mixing Valves:
  1. Manufacturers:
    - a. Watts; \_\_\_\_\_
  2. Lavatory tempering valve shall be ASSE 1070 and cUPC listed All internal components shall be from corrosion resistant material The valve must control each performance standard down to 0.5 gpm (1.00 lpm) for LFE480 Capacity of the valve must be 3 gpm (11 lpm) @ 45psi differential or 4 gpm (15 lpm) @ 45psi differential. Thermostatic lavatory tempering valve shall be constructed using Lead Free\* brass material which shall comply with state codes and standards, where applicable requiring reduced lead content. Control temperature must be adjustable between 80 - 120° F (32-43°C) with a locking nut to prevent unauthorized or accidental adjustment. The valve shall contain integral checks to prevent cross flow and inlet screens to filter debris. The valve shall be a Powers SeriesS LFE480

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Install floor cleanouts at elevation to accommodate finished floor.
- D. Install approved portable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
- E. Pipe relief from backflow preventer to nearest drain.
- F. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatory sinks, washing machine outlets, or \_\_\_\_\_.

**END OF SECTION**

**SECTION 22 3000**  
**PLUMBING EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Water heaters.
- B. Pumps.
  - 1. Circulators.
  - 2. Sewage Ejectors.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. ANSI Z21.10.3 - Gas-Fired Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous; 2014.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide cut sheet of submitted equipment.
- C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.05 QUALITY ASSURANCE**

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

**1.06 CERTIFICATIONS**

- A. Gas Water Heaters: Certified by CSA International to ANSI Z21.10.1 or ANSI Z21.10.3, as applicable, in addition to requirements specified elsewhere.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

**1.08 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for domestic water heaters.

**PART 2 PRODUCTS**

**2.01 COMMERCIAL GAS FIRED WATER HEATERS**

- A. AO Smith - GPVT-40\_\_\_\_
- B. 3-position rotatable blower outlet which adds flexibility
- C. Combined horizontal and vertical vent runs up to 180 equivalent feet with 4" diameter venting (ABS, PVC, CPVC and polypropylene)
- D. Protected sensor that detects the presence of flammable vapors and automatically disables the burner to prevent ignition.
- E. Air intake snorkel elevates the inlet location of combustion air to prevent flammable vapors from entering the sealed combustion chamber.
- F. Reduced NOx emissions comply with air quality management district regulations.
- G. DYNACLEAN™ DIFFUSER DIP TUBE: Reduces lime and sediment buildup and maximizes hot water output. Made from long-lasting PEX cross-linked polymer.
- H. Certified at 150 PSI working pressure.

- I. Certified to ANSI Z21.10.1-CSA 4.1 or ANSI Z21.10.3-CSA 4.3 standards governing storage tank-type water heaters.
- J. 6-YEAR LIMITED TANK AND PARTS WARRANTY

## **2.02 SEWAGE EJECTOR PUMPS**

- A. Manufacturers: LIBERTY PUMPS - LSGX
- B. Type: Vertical centrifugal, direct connection, duplex arrangement.
- C. Tank: Wound fiberglass with anti-flotation flange and steel cover. Cover shall be stamped "SANITARY".
- D. Capacity: 264 gallons (36" diameter x 60" deep).
- E. Guide Rail: Schedule 40 steel, galvanized.
- F. Inlet hub: 4" with flange gasket and pipe seal
- G. Discharge hub: 2" schedule 80 PVC.
- H. Control. NEMA 4X duplex alternating panel, outdoor with audible/visual high water alarm.
- I. Impeller: 300 series stainless steel.
- J. Powdercoating.
- K. Motor housing and volute: Class 25 cast iron.
- L. O-rings: Buna-N.
- M. Mechanical seal: Unitized Silicon Carbide.
- N. Max. Liquid Temperature: 140-degrees F. Max. Stator Temperature: 275-degrees F.
- O. Pump characteristics: 45 gpm at 25 ft-hd

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.
- B. Coordinate with plumbing piping and related fuel piping and gas venting work to achieve operating system.
- C. Pumps:
  - 1. 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 percent of midpoint of published maximum efficiency curve.

**END OF SECTION**

**SECTION 22 4000**  
**PLUMBING FIXTURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Water closets.
- B. Lavatories.
- C. Sinks.
- D. Electric water coolers.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 9200 - Joint Sealants: Sealing joints between fixtures and walls and floors.
- B. Section 22 1005 - Plumbing Piping.
- C. Section 22 1006 - Plumbing Piping Specialties.
- D. Section 22 3000 - Plumbing Equipment.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Manufacturer's Instructions: Indicate installation methods and procedures.
- D. Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented 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 DELIVERY, STORAGE, AND HANDLING**

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

**1.07 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for electric water cooler.

**PART 2 PRODUCTS**

**2.01 FLUSH VALVE WATER CLOSETS**

- A. Water Closets: Vitreous china, ASME A112.19.2, wall hung, siphon jet flush action, china bolt caps.
  - 1. Flush Valve: Exposed (top spud).
  - 2. Flush Operation: Manual, oscillating handle.
  - 3. Handle Height: 44 inches or less.
  - 4. Supply Size: 1 inches.
  - 5. Outlet Size: 2 inches.
  - 6. Color: White.



- B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
  - 1. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
- C. Seats:
  - 1. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, with cover.
- D. Water Closet Carriers:
  - 1. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

## **2.02 LAVATORIES**

- A. Vitreous China Wall Hung Basin: ADA Compliant, ASME A112.19.2; vitreous china wall hung lavatory, 18.5 by 17 inch minimum, with 4 inch high back, rectangular basin with splash lip, front overflow, and soap depression.
  - 1. Drilling Centers: 4 inch.
- B. Supply Faucet: ASME A112.18.1; ADA Compliant, hand operated, chrome plated, cast brass body with integral shank. quarter turn ceramic disc cartridges and 4" long integral cast spout, 0.5 gpm aerator, mounting hardware, 1/2" NPSM coupling nuts for standard lavatory risers.
- C. Accessories:
  - 1. Chrome plated 17 gage, 0.0538 inch brass P-trap with clean-out plug and arm with escutcheon.
  - 2. Offset waste with perforated open strainer.
  - 3. Screwdriver stops.
  - 4. Flexible supplies.
  - 5. Carrier:
    - a. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded studs for fixture hanger, bearing plate and studs.

## **2.03 ELECTRIC WATER COOLERS**

- A. Water Cooler: ADA Compliant, bi-level, electric water cooler with top mounted bottle filler, mechanically refrigerated; surface handicapped mounted; stainless steel top, vinyl on steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air cooled condenser and stainless steel grille.
  - 1. Capacity: 8 gallons per minute of 50 degrees F water with inlet at 80 degrees F and room temperature of 90 degrees F, when tested in accordance with ASHRAE Std 18.
  - 2. Electrical: 115 V, 60 Hertz compressor, 6 foot cord and plug for connection to electric wiring system including grounding connector.

## **2.04 SERVICE SINKS**

- A. Bowl: 24 by 24 by 10 inch high white molded stone, floor mounted, with one inch wide shoulders, vinyl bumper guard, stainless steel strainer.
- B. Trim: ASME A112.18.1 exposed wall type supply with lever handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges.
- C. Accessories:
  - 1. 5 feet of 1/2 inch diameter plain end reinforced plastic hose.
  - 2. Hose clamp hanger.
  - 3. Mop hanger.

## **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.

### **3.02 PREPARATION**

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

### **3.03 INSTALLATION**

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall supports and bolts.
- E. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

### **3.04 INTERFACE WITH WORK OF OTHER SECTIONS**

- A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

### **3.05 ADJUSTING**

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

### **3.06 CLEANING**

- A. Clean plumbing fixtures and equipment.

### **3.07 PROTECTION**

- A. Protect installed products from damage due to subsequent construction operations.
- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

### **3.08 SCHEDULES**

- A. Fixture Heights: Install fixtures to heights to be ADA compliant.

**END OF SECTION**

## **SECTION 23 0513**

### **COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Single phase electric motors.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

##### **1.03 REFERENCE STANDARDS**

- A. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2014.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

##### **1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.

##### **1.05 QUALITY ASSURANCE**

- A. Conform to NFPA 70.

##### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

##### **1.07 WARRANTY**

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

#### **PART 2 PRODUCTS**

##### **2.01 GENERAL CONSTRUCTION AND REQUIREMENTS**

- A. Electrical Service: Refer to Section 26 2717 for required electrical characteristics.
- B. Construction:
  - 1. Open drip-proof type except where specifically noted otherwise.
  - 2. Design for continuous operation in 40 degrees C environment.
  - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- D. Wiring Terminations:
  - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
  - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

##### **2.02 APPLICATIONS**

- A. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
- B. Single phase motors for fans and air compressors: Capacitor start type.
- C. Single phase motors for fans: Capacitor start, capacitor run type.
- D. Motors located in outdoors: Totally enclosed weatherproof epoxy-treated type.

- E. Motors located outdoors: Totally enclosed weatherproof epoxy-sealed type.

### **2.03 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS**

- A. Starting Torque: Exceeding one fourth of full load torque.
- B. Starting Current: Up to six times full load current.
- C. Multiple Speed: Through tapped windings.
- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

### **2.04 SINGLE PHASE POWER - CAPACITOR START MOTORS**

- A. Starting Torque: Three times full load torque.
- B. Starting Current: Less than five times full load current.
- C. Pull-up Torque: Up to 350 percent of full load torque.
- D. Breakdown Torque: Approximately 250 percent of full load torque.
- E. Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.
- F. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve bearings.
- G. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C. Check line voltage and phase and ensure agreement with nameplate.

**END OF SECTION**

## **SECTION 23 0548**

### **VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Equipment support bases.
- B. Vibration isolators.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete.

##### **1.03 REFERENCE STANDARDS**

- A. SMACNA (SRM) - Seismic Duct Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors' National Association; 2008.

##### **1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data:
  - 1. Provide manufacturer's product literature documenting compliance with PART 2 PRODUCTS.

##### **1.05 QUALITY ASSURANCE**

- A. Perform design and installation in accordance with applicable codes.

#### **PART 2 PRODUCTS**

##### **2.01 PERFORMANCE REQUIREMENTS**

- A. General:
  - 1. All vibration isolators, base frames and inertia bases to conform to all uniform deflection and stability requirements under all operating loads.
  - 2. Steel springs to function without undue stress or overloading.

##### **2.02 EQUIPMENT SUPPORT BASES**

- A. Concrete Inertia Bases:
  - 1. Construction: Engineered, steel forms, with integrated isolator brackets and anchor bolts, welded or tied reinforcing bars running both ways in a single layer.
  - 2. Size: 4 inches minimum depth and sized to accommodate elbow supports.
  - 3. Mass: Minimum of 1.5 times weight of isolated equipment.
  - 4. Connecting Point: Reinforced to connect isolators and snubbers to base including template and fastening devices for equipment.
  - 5. Concrete: Filled on site with minimum 3000 psi concrete. See Section 03 3000 for additional requirements.

##### **2.03 VIBRATION ISOLATORS**

- A. Non-Seismic Type:
  - 1. All Elastomeric-Fiber Glass Pads:
    - a. Configuration: Flat or molded.
    - b. Thickness: 0.25 inch minimum.
    - c. Assembly: Single or multiple layers using bonded, galvanized sheet metal separation plate between each layer with load plate providing evenly distributed load over pad surface.
  - 2. Elastomeric Mounts:
    - a. Material: Oil, ozone, and oxidant resistant compounds.
    - b. Assembly: Encapsulated load transfer plate bolted to equipment and base plate with anchor hole bolted to supporting structure.
  - 3. Steel Springs:
    - a. Assembly: Freestanding, laterally stable without housing.

- b. Leveling Device: Rigidly connected to equipment or frame.
- 4. Restrained Steel Springs:
  - a. Housing: Rigid blocking during rigging prevents equipment installed and operating height from changing during temporary weight reduction.
  - b. Equipment Wind Loading: Adequate means for fastening isolator top to equipment and isolator base plate to supporting structure.
- 5. Elastomeric Hangers:
  - a. Housing: Steel construction containing elastomeric isolation element to prevent rod contact with housing and short-circuiting of isolating function.
  - b. Incorporate steel load distribution plate sandwiching elastomeric element to housing.
- 6. Spring Hanger:
  - a. Housing: Steel construction containing stable steel spring and integral elastomeric element preventing metal to metal contact.
  - b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.
- 7. Combination Elastomeric-Spring Hanger:
  - a. Housing: Steel construction containing stable steel spring with elastomeric element in series isolating upper connection of hanger box to building structure.
  - b. Bottom Opening: Sized to allow plus/minus 15 degrees rod misalignment.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION - GENERAL**

- A. Install in accordance with manufacturer's instructions.
- B. Bases:
  - 1. Set concrete inertia bases for 2 inches clearance between housekeeping pad and base.
  - 2. Adjust equipment level.
- C. On closed spring isolators, adjust so side stabilizers are clear under normal operating conditions.
- D. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height. When full load is applied, adjust isolators to load to allow shim removal.
- E. Support piping connections to equipment mounted on isolators using isolators or resilient hangers for scheduled distance.
  - 1. Up to 4 Inches Pipe Size: First three points of support.

**END OF SECTION**

**SECTION 23 0553**  
**IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nameplates.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 9123 - Interior Painting: Identification painting.

**1.03 REFERENCE STANDARDS**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2013.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

**PART 2 PRODUCTS**

**2.01 IDENTIFICATION APPLICATIONS**

- A. Air Handling Units: Nameplates.
- B. Ductwork: Nameplates.
- C. Thermostats: Nameplates.

**2.02 NAMEPLATES**

- A. Letter Color: White.
- B. Letter Height: 1/4 inch.
- C. Background Color: Black.
- D. Plastic: Conform to ASTM D709.

**2.03 ADHESIVE-BACKED DUCT MARKERS**

- A. Material: High gloss acrylic adhesive-backed vinyl film; printed with UV and chemical resistant inks.
- B. Style: Individual Label.
- C. Color: Yellow/Black.
- D. Size: \_\_\_\_\_.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 9123 for stencil painting.

**3.02 INSTALLATION**

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

**END OF SECTION**

**SECTION 23 0593**  
**TESTING, ADJUSTING, AND BALANCING FOR HVAC**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Testing, adjustment, and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 2100 - Allowances: Inspection and testing allowances.

**1.03 REFERENCE STANDARDS**

- A. NEBB (TAB) - Procedural Standard for Testing Adjusting and Balancing of Environmental Systems; National Environmental Balancing Bureau; 2005, Seventh Edition.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
  - 1. Include at least the following in the plan:
    - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
    - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
    - c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
    - d. Final test report forms to be used.
    - e. Procedures for formal deficiency reports, including scope, frequency and distribution.
- C. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
  - 1. Revise TAB plan to reflect actual procedures and submit as part of final report.
  - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
  - 3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
  - 4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
  - 5. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 GENERAL REQUIREMENTS**

- A. Perform total system balance in accordance with one of the following:
  - 1. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. TAB Agency Qualifications:
  - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
  - 2. Having minimum of three years documented experience.
  - 3. Certified by one of the following:
    - a. NEBB, National Environmental Balancing Bureau: [www.nebb.org](http://www.nebb.org).



D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

### **3.02 EXAMINATION**

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
  - 1. Systems are started and operating in a safe and normal condition.
  - 2. Temperature control systems are installed complete and operable.
  - 3. Final filters are clean and in place. If required, install temporary media in addition to final filters.
  - 4. Fire and volume dampers are in place and open.
  - 5. Air outlets are installed and connected.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

### **3.03 PREPARATION**

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.

### **3.04 ADJUSTMENT TOLERANCES**

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

### **3.05 RECORDING AND ADJUSTING**

- A. Field Logs: Maintain written logs including:
  - 1. Running log of events and issues.
  - 2. Discrepancies, deficient or uncompleted work by others.
  - 3. Contract interpretation requests.
  - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

### **3.06 AIR SYSTEM PROCEDURE**

- A. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- B. Measure air quantities at air inlets and outlets.
- C. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- D. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

### **3.07 MINIMUM DATA TO BE REPORTED**

- A. Air Moving Equipment:
  - 1. Location
  - 2. Manufacturer
  - 3. Model number
  - 4. Serial number
  - 5. Arrangement/Class/Discharge

6. Air flow, specified and actual
  7. Return air flow, specified and actual
  8. Outside air flow, specified and actual
  9. Sheave Make/Size/Bore
  10. Number of Belts/Make/Size
  11. Fan RPM
- B. Exhaust Fans:
1. Location
  2. Manufacturer
  3. Model number
  4. Serial number
  5. Air flow, specified and actual
  6. Sheave Make/Size/Bore
  7. Number of Belts/Make/Size
  8. Fan RPM

**END OF SECTION**

**SECTION 23 0713**  
**DUCT INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Duct insulation.

**1.02 RELATED REQUIREMENTS**

- A. Section 23 3100 - HVAC Ducts and Casings: Glass fiber ducts.

**1.03 REFERENCE STANDARDS**

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. 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 products of the type specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum 3 years of experience and approved by manufacturer.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

**1.07 FIELD CONDITIONS**

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

**PART 2 PRODUCTS**

**2.01 REGULATORY REQUIREMENTS**

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

**2.02 GLASS FIBER, FLEXIBLE**

- A. Manufacturer:
  - 1. Knauf Insulation; \_\_\_\_\_: [www.knaufinsulation.com](http://www.knaufinsulation.com).
  - 2. Johns Manville; \_\_\_\_\_: [www.jm.com](http://www.jm.com).

3. Owens Corning Corporation; \_\_\_\_\_: [www.ocbuildingspec.com](http://www.ocbuildingspec.com).
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
  1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
  2. Maximum Service Temperature: 250 degrees F.
  3. Maximum Water Vapor Absorption: 5.0 percent by weight.
  4. All Supply Ductwork & last 10' of Exhaust Ductwork to have 2" insulation.
- C. Vapor Barrier Jacket:
  1. Kraft paper with glass fiber yarn and bonded to aluminized film.
  2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
  3. Secure with pressure sensitive tape.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that ducts have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated ducts conveying air below ambient temperature:
  1. Provide insulation with vapor barrier jackets.
  2. Finish with tape and vapor barrier jacket.
  3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
  4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Insulated ducts conveying air above ambient temperature:
  1. Provide with or without standard vapor barrier jacket.
  2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- E. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

**END OF SECTION**

**SECTION 23 2300**  
**REFRIGERANT PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Piping.
- B. Refrigerant.
- C. Moisture and liquid indicators.
- D. Valves.
- E. Strainers.
- F. Check valves.
- G. Pressure regulators.
- H. Pressure relief valves.
- I. Filter-driers.
- J. Solenoid valves.
- K. Expansion valves.
- L. Receivers.
- M. Flexible connections.

**1.02 RELATED REQUIREMENTS**

- A. Section 08 3100 - Access Doors and Panels.
- B. Section 09 9123 - Interior Painting.
- C. Section 22 0719 - Plumbing Piping Insulation.
- D. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. AHRI 495 - Performance Rating of Refrigerant Liquid Receivers; Air-Conditioning, Heating, and Refrigeration Institute; 2005.
- B. AHRI 710 - Performance Rating of Liquid-Line Driers; Air-Conditioning, Heating, and Refrigeration Institute; 2009.
- C. AHRI 750 - Standard for Thermostatic Refrigerant Expansion Valves; Air-Conditioning, Heating, and Refrigeration Institute; 2007.
- D. AHRI 760 - Standard for Performance Rating of Solenoid Valves for Use With Volatile Refrigerants; Air-Conditioning, Heating, and Refrigeration Institute; 2007.
- E. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2013 (ANSI/ASHRAE Std 15).
- F. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2013.
- G. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; The American Society of Mechanical Engineers; 2013.
- H. ASME B16.26 - Cast Copper Alloy Fittings For Flared Copper Tubes; The American Society of Mechanical Engineers; 2013.
- I. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; The American Society of Mechanical Engineers; 2013.
- J. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.
- K. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.

- L. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2013.
- M. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2011-AMD 1.
- N. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.
- O. UL 429 - Electrically Operated Valves; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

#### **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 ASME B31.5 unless indicated otherwise.
- C. Liquid Indicators:
  - 1. Use line size liquid indicators in main liquid line leaving condenser.
  - 2. If receiver is provided, install in liquid line leaving receiver.
  - 3. Use line size on leaving side of liquid solenoid valves.
- D. Valves:
  - 1. Use service valves on suction and discharge of compressors.
  - 2. Use gage taps at compressor inlet and outlet.
  - 3. Use gage taps at hot gas bypass regulators, inlet and outlet.
  - 4. Use check valves on compressor discharge.
  - 5. Use check valves on condenser liquid lines on multiple condenser systems.
- E. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.
- F. Strainers:
  - 1. Use line size strainer upstream of each automatic valve.
  - 2. Where multiple expansion valves with integral strainers are used, use single main liquid line strainer.
  - 3. On steel piping systems, use strainer in suction line.
  - 4. Use shut-off valve on each side of strainer.
- G. Filter-Driers:
  - 1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.

#### **1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.

#### **1.06 QUALITY ASSURANCE**

- A. Designer Qualifications: Design piping system under direct supervision of a Professional Engineer experienced in design of this type of work.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 3 years of documented experience.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store piping and specialties in shipping containers with labeling in place.

- B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
- C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

## **PART 2 PRODUCTS**

### **2.01 PIPING**

- A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
  - 1. Fittings: ASME B16.22 wrought copper.
  - 2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
- B. Copper Tube to 7/8 inch OD: ASTM B88 (ASTM B88M), Type K (A), annealed.
  - 1. Fittings: ASME B16.26 cast copper.
  - 2. Joints: Flared.
- C. Pipe Supports and Anchors:
  - 1. Provide hangers and supports that comply with MSS SP-58.
    - a. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
  - 2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  - 3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  - 4. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  - 5. Vertical Support: Steel riser clamp.
  - 6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
  - 7. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
  - 8. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

### **2.02 REFRIGERANT**

- A. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.
- B. Refrigerant: 410A as defined in ASHRAE Std 34.

### **2.03 MOISTURE AND LIQUID INDICATORS**

- A. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 500 psi.

### **2.04 VALVES**

- A. Diaphragm Packless Valves:
  - 1. UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, solder or flared ends, with positive backseating; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.
- B. Packed Angle Valves:
  - 1. Forged brass or nickel plated forged steel, forged brass seal caps with copper gasket, rising stem and seat with backseating, molded stem packing, solder or flared ends; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.
- C. Ball Valves:
  - 1. Two piece bolted forged brass body with teflon ball seals and copper tube extensions, brass bonnet and seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure of 500 psi and maximum temperature of 300 degrees F.
- D. Service Valves:

1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends, for maximum pressure of 500 psi.

## **2.05 STRAINERS**

- A. Straight Line or Angle Line Type:
  1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi.
- B. Straight Line, Non-Cleanable Type:
  1. Steel shell, copper plated fittings, stainless steel wire screen, for maximum working pressure of \_\_\_\_\_ psi.

## **2.06 CHECK VALVES**

- A. Straight Through Type:
  1. Brass body and disc, phosphor-bronze or stainless steel spring, neoprene seat; for maximum working pressure of 500 psi and maximum temperature of 200 degrees F.

## **2.07 PRESSURE REGULATORS**

- A. Brass body, stainless steel diaphragm, direct acting, adjustable over 0 to 80 psi range, for maximum working pressure of 450 psi.

## **2.08 PRESSURE RELIEF VALVES**

- A. Straight Through or Angle Type: Brass body and disc, neoprene seat, factory sealed and stamped with ASME UV and National Board Certification NB, selected to ASHRAE Std 15, with standard setting of 235 psi.

## **2.09 FILTER-DRIERS**

- A. Performance:
  1. Flow Capacity - Liquid Line: \_\_\_\_\_ ton, minimum, rated in accordance with AHRI 710.
  2. Pressure Drop: 2 psi, maximum, when operating at full connected evaporator capacity.
  3. Design Working Pressure: 350 psi, minimum.
- B. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass into refrigerant lines.
- C. Construction: UL listed.
  1. Connections: As specified for applicable pipe type.

## **2.10 SOLENOID VALVES**

- A. Valve: AHRI 760, pilot operated, copper, brass or steel body and internal parts, synthetic seat, stainless steel stem and plunger assembly (permitting manual operation in case of coil failure), integral strainer, with flared, solder, or threaded ends; for maximum working pressure of 500 psi.
- B. Coil Assembly: UL 429, UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box with pilot light.

## **2.11 EXPANSION VALVES**

- A. Angle or Straight Through Type: AHRI 750; design suitable for refrigerant, brass body, internal or external equalizer, bleed hole, adjustable superheat setting, replaceable inlet strainer, with non-replaceable capillary tube and remote sensing bulb and remote bulb well.
- B. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 degrees F superheat. Select to avoid being undersized at full load and excessively oversized at part load.



## **2.12 ELECTRONIC EXPANSION VALVES**

- A. Valve:
  - 1. Brass body with flared or solder connection, needle valve with floating needle and machined seat, stepper motor drive.
- B. Evaporation Control System:
  - 1. Electronic microprocessor based unit in enclosed case, proportional integral control with adaptive superheat, maximum operating pressure function, preselection allowance for electrical defrost and hot gas bypass.
- C. Refrigeration System Control: Electronic microprocessor based unit in enclosed case, with proportional integral control of valve, on/off thermostat, air temperature alarm (high and low), solenoid valve control, liquid injection adaptive superheat control, maximum operating pressure function, night setback thermostat, timer for defrost control.

## **2.13 RECEIVERS**

- A. Internal Diameter 6 inch and Smaller:
  - 1. AHRI 495, UL listed, steel, brazed; 400 psi maximum pressure rating, with tappings for inlet, outlet, and pressure relief valve.

## **2.14 FLEXIBLE CONNECTORS**

- A. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure of 500 psi.

# **PART 3 EXECUTION**

## **3.01 INSTALLATION**

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.5.
  - 2. Support horizontal piping as scheduled.
  - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  - 4. Place hangers within 12 inches of each horizontal elbow.
  - 5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
  - 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 7. Provide copper plated hangers and supports for copper piping.
- 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 percent in direction of flow.
- 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 with Section 08 3100.
- 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. Refer to Section 09 9123.

- L. Insulate piping and equipment; refer to Section and Section 22 0716.
- M. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.
- N. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.
- O. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.
- P. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.
- Q. Install flexible connectors at right angles to axial movement of compressor, parallel to crankshaft.
- R. Fully charge completed system with refrigerant after testing.
- S. Provide electrical connection to solenoid valves. Refer to Section 26 2717.

### **3.02 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Test refrigeration system in accordance with ASME B31.5.
- C. Pressure test system with dry nitrogen to 200 psi. Perform final tests at 27 inches vacuum and 200 psi using halide torch. Test to no leakage.

### **3.03 SCHEDULES**

- A. Hanger Spacing for Copper Tubing.
  - 1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.
  - 2. 1-1/8 inch OD: Maximum span, 6 feet; minimum rod size, 1/4 inch.
  - 3. 1-3/8 inch OD: Maximum span, 7 feet; minimum rod size, 3/8 inch.
  - 4. 1-5/8 inch OD: Maximum span, 8 feet; minimum rod size, 3/8 inch.

**END OF SECTION**

**SECTION 23 3100**  
**HVAC DUCTS AND CASINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Metal ductwork.
- B. Casing and plenums.
- C. Duct cleaning.

**1.02 REFERENCE STANDARDS**

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2012.
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for duct materials.
- C. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for \_\_\_\_\_ pressure class and higher systems.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 3 years of documented experience.

**1.05 FIELD CONDITIONS**

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

**PART 2 PRODUCTS**

**2.01 DUCT ASSEMBLIES**

- A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.
- B. Ducts: Galvanized steel, unless otherwise indicated.
- C. Low Pressure Supply (Heating Systems): 1 inch w.g. pressure class, galvanized steel.
- D. Low Pressure Supply (System with Cooling Coils): 1 inch w.g. pressure class, galvanized steel.
- E. Return and Relief: 1 inch w.g. pressure class, galvanized steel.
- F. General Exhaust: 1 inch w.g. pressure class, galvanized steel.

**2.02 MATERIALS**

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

### **2.03 DUCTWORK FABRICATION**

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- E. Fabricate continuously welded round duct fittings in accordance with SMACNA (DCS).
- F. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

### **2.04 MANUFACTURED DUCTWORK AND FITTINGS**

### **2.05 CASINGS**

- A. Fabricate casings in accordance with SMACNA (DCS) and construct for operating pressures indicated.
- B. Mount floor mounted casings on 4 inch high concrete curbs. At floor, rivet panels on 8 inch centers to angles. Where floors are acoustically insulated, provide liner of galvanized 18 gage, 0.0478 inch expanded metal mesh supported at 12 inch centers, turned up 12 inches at sides with sheet metal shields.
- C. Reinforce door frames with steel angles tied to horizontal and vertical plenum supporting angles. Install hinged access doors where indicated or required for access to equipment for cleaning and inspection.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- G. At exterior wall louvers, seal duct to louver frame and install blank-out panels.

### **3.02 CLEANING**

- A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.
- B. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.

**END OF SECTION**

**SECTION 23 3300**  
**AIR DUCT ACCESSORIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Backdraft dampers - metal.
- B. Backdraft dampers - fabric.
- C. Combination fire and smoke dampers.
- D. Duct access doors.
- E. Fire dampers.
- F. Flexible duct connections.
- G. Smoke dampers.
- H. Volume control dampers.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 8400 - Firestopping.
- B. Section 23 3100 - HVAC Ducts and Casings.
- C. Section 23 3600 - Air Terminal Units: Pressure regulating damper assemblies.
- D. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2012.
- B. NFPA 92 - Standard for Smoke-Control Systems; 2015.
- C. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2014.
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.
- E. UL 33 - Standard for Safety Heat Responsive Links for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.
- F. UL 555 - Standard for Fire Dampers; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers and duct access doors. Include electrical characteristics and connection requirements.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect dampers from damage to operating linkages and blades.

**PART 2 PRODUCTS**

**2.01 BACKDRAFT DAMPERS - METAL**

- A. Manufacturers:
  - 1. Ruskin Company: [www.ruskin.com](http://www.ruskin.com).

- B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

## **2.02 BACKDRAFT DAMPERS - FABRIC**

- A. Fabric Backdraft Dampers: Factory-fabricated.
  - 1. Blades: Neoprene coated fabric material.
  - 2. Birdscreen: 1/2 inch nominal mesh of galvanized steel or aluminum.
  - 3. Maximum Velocity: 1000 fpm (5 m/sec) face velocity.

## **2.03 COMBINATION FIRE AND SMOKE DAMPERS**

## **2.04 DUCT ACCESS DOORS**

- A. Manufacturers:
  - 1. Ruskin Company: [www.ruskin.com](http://www.ruskin.com).
- B. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
  - 1. Less Than 12 inches Square: Secure with sash locks.
  - 2. Up to 18 inches Square: Provide two hinges and two sash locks.
  - 3. Up to 24 x 48 inches: Three hinges and two compression latches with outside and inside handles.

## **2.05 FIRE DAMPERS**

- A. Manufacturers:
  - 1. Ruskin Company: [www.ruskin.com](http://www.ruskin.com).
- B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- C. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.
- D. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

## **2.06 FLEXIBLE DUCT CONNECTIONS**

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.

## **2.07 SMOKE DAMPERS**

## **2.08 VOLUME CONTROL DAMPERS**

- A. Manufacturers:
  - 1. Ruskin Company: [www.ruskin.com](http://www.ruskin.com).
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
  - 1. Fabricate for duct sizes up to 6 x 30 inch.
  - 2. Blade: 24 gage, 0.0239 inch, minimum.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Verify that electric power is available and of the correct characteristics.

### **3.02 INSTALLATION**

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.

- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Provide fire dampers, combination fire and smoke dampers, and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- D. Install smoke dampers and combination smoke and fire dampers in accordance with NFPA 92.
- E. Demonstrate re-setting of fire dampers to Owner's representative.
- F. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- G. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- H. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- I. Provide balancing dampers on high velocity systems where indicated. Refer to Section 23 3600 - Air Terminal Units.
- J. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

**END OF SECTION**

**SECTION 23 3416**  
**CENTRIFUGAL HVAC FANS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Forward curved centrifugal fans.
- B. Inline centrifugal fans.
- C. Motors and drives.

**1.02 RELATED REQUIREMENTS**

- A. Section 22 0513 - Common Motor Requirements for Plumbing Equipment.
- B. Section 22 0548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
- C. Section 23 0713 - Duct Insulation.
- D. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. AMCA 99 - Standards Handbook; Air Movement and Control Association International, Inc.; 2010.
- B. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 2014.
- C. SMACNA (DCS) - HVAC Duct Construction Standards; 2005.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on centrifugal fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate assembly of centrifugal fans and accessories including fan curves with specified operating point clearly plotted, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect motors, shafts, and bearings from weather and construction dust.

**1.07 FIELD CONDITIONS**

- A. Permanent fans may not be used for ventilation during construction.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Loren Cook Company; \_\_\_\_\_: [www.lorencook.com](http://www.lorencook.com).
- B. Greenheck.

**2.02 WHEEL AND INLET**

- A. Forward Curved: Black enameled steel construction with inlet flange, back plate, shallow blades with inlet and tip curved forward in direction of airflow, mechanically secured to flange and back plate; steel hub swaged to back plate and keyed to shaft with set screw.



### **2.03 HOUSING**

- A. Heavy gage steel, spot welded for AMCA 99 Class I and II fans, and continuously welded for Class III, adequately braced, designed to minimize turbulence with spun inlet bell and shaped cut
- B. Factory finish before assembly to manufacturer's standard. For fans handling air downstream of humidifiers, provide two additional coats of paint. Prime coating on aluminum parts is not required.
- C. Provide bolted construction with horizontal flanged split housing, where indicated.
- D. Fabricate plug fans without volute housing, in lined steel cabinet. Refer to Section 23 0713.

### **2.04 BEARINGS AND DRIVES**

- A. Drive: Cast iron or steel sheaves, dynamically balanced, keyed. Variable and adjustable pitch sheaves for motors 15 hp and under, selected so required rpm is obtained with sheaves set at mid Fixed sheave for 20 hp and over, matched belts, and drive rated as recommended by manufacturer or minimum 1.5 times nameplate rating of the motor.

**END OF SECTION**

**SECTION 23 3700**  
**AIR OUTLETS AND INLETS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Registers/grilles.
- B. Louvers.

**1.02 REFERENCE STANDARDS**

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; Air Movement and Control Association International, Inc.; 2012.
- B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.; 2006 (R2011).
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

**1.04 QUALITY ASSURANCE**

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Test and rate louver performance in accordance with AMCA 500-L.

**1.05 QUALITY ASSURANCE**

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

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Titus; \_\_\_\_\_: [www.titus-hvac.com](http://www.titus-hvac.com).
- B. Ruskin Louvers\_\_\_\_\_.

**2.02 DUCT MOUNTED SUPPLY & EXHAUST REGISTERS/GRILLES (G-A)**

- A. Titus - Spiral S300FL: Aluminum supply grilles shall be TITUS direct spiral duct-mounted supply grilles model S301F (single deflection) or S300F (double deflection) or S8F (perforated face) for the sizes and mounting types as shown on the plans and outlet schedule. The deflection blades shall be available parallel to the long or short dimension of the grille. All supply grilles shall be constructed with radius end caps and foam gaskets for a tight seal to the duct diameter. All supply grilles shall be constructed with a 1 3/8-inch wide border.
- B. Blades shall be constructed of heavy duty extruded aluminum and shall be spaced 3/4-inch apart. Blades shall extend completely through the side frame on each side to ensure stability throughout the complete cfm operating range of the grille. Blades shall be individually adjustable without loosening or rattling and shall be securely held in place with tension wire.
- C. Optional air scoop damper/extractor (option ASD) shall be constructed of heavy duty aluminum. The ASD must be operable from the face with a screwdriver.
- D. The grille color will be selected by Architect. The finish shall be an anodic acrylic paint, baked at 315°F for 30 minutes. The pencil hardness must be HB to H. The paint must pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering or deterioration of film. The paint must pass a 250-hour ASTM D870 Water Immersion Test. The paint must also pass the ASTM D2794 Reverse Impact Cracking Test with a 50-inch pound force applied.

### **2.03 DUCT MOUNTED RETURN REGISTERS/GRILLES (G-B)**

- A. Titus - 301FL Furnace Return Grille: Aluminum supply grilles shall be TITUS Model 301F (single deflection) of the sizes and mounting types shown on the plans and outlet schedule. The deflection blades shall be available parallel to the long dimension of the grille or register. Construction shall be of aluminum with a 1¼-inch wide border on all sides. Sizes 24 x 24 inches and below shall have roll-formed borders with a minimum thickness of 0.032 inch. Larger sizes shall be constructed using continuous aluminum extrusions with a nominal thickness of 0.040 through 0.050 inch and shall be interlocked at the four corners and mechanically staked to form a rigid frame. Screw holes shall be countersunk for a neat appearance.
- B. Deflection blades shall be contoured to a specifically designed and tested cross-section to meet published test performance data. Blades shall be spaced on ¾-inch centers. Blades shall have friction pivots on both sides to allow individual blade adjustment without loosening or rattling or be inserted through the frame and held tight with steel friction wire interlocked to the frame on both ends of each side. Plastic blade pivots are not acceptable.
- C. Optional opposed blade volume damper shall be constructed of heavy gauge steel or aluminum. Damper must be operable from the face of the grille.
- D. The grille finish shall be #26 white. The finish shall be an anodic acrylic paint, baked at 315° F for 30 minutes. The pencil hardness must be HB to H. The paint must pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering or deterioration of film. The paint must pass a 250-hour ASTM D870 Water Immersion Test. The paint must also pass the ASTM D2794 Reverse Impact Cracking Test with a 50-inch pound force applied.

### **2.04 LOUVERS**

- A. Type: 6 inch deep with blades on 45 degree slope with center baffle and return bend, heavy channel frame, 1/2 inch square mesh screen over exhaust and 1/2 inch square mesh screen over intake.
- B. Fabrication: 16 gage, 0.0598 inch thick galvanized steel welded assembly, with factory prime coat finish.
- C. Color: To be selected by Architect from manufacturer's standard range.
- D. Mounting: Furnish with interior flat flange for installation.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
- C. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

**END OF SECTION**

## **SECTION 23 5400**

### **FURNACES**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Forced air furnaces.
- B. Controls.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 23 0513 - Common Motor Requirements for HVAC Equipment: Additional requirements for fan motors.
- B. Section 23 0913 - Instrumentation and Control Devices for HVAC: Thermostats, humidistats, time clocks.

##### **1.03 REFERENCE STANDARDS**

- A. AHRI 610 - Performance Rating of Central System Humidifiers; Air Conditioning, Heating, and Refrigeration Institute; 2004.
- B. ASHRAE Std 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings, Refrigerating and Air-Conditioning Engineers, Inc.; 2013, Including All Addenda (ANSI/ASHRAE/IES Std 90.1).
- C. NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 2015.
- D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2012.
- E. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances; National Fire Protection Association; 2013.

##### **1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

##### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience and approved by manufacturer.

##### **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 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturers warranty for heat exchangers and condensing units.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Trane Inc.; XC95m: [www.trane.com](http://www.trane.com).

##### **2.02 GAS FIRED FURNACES**

- A. Annual Fuel Utilization Efficiency (AFUE): 0.95 ("condensing").

- B. MODULATING OPERATION: The modulating gas valves provides longer heating cycles for more consistent heating comfort. Modulates from 40% to 100% in less than 1% increments of the furnace's heating capacity saving energy, while at the same time maximizing homeowner comfort.
- C. COMMUNICATING MODE: Furnace is shipped ready to be connected in communicating mode using three wire hook-up using TCONT900 comfort control.
- D. COMFORT CONTROL: Comfortlink II Communicating furnace design, offers plug and play – walk away installation. Assures the entire heating and air conditioning system is set up in the proper modes to optimize the engineered performance of the matched system installed. The furnace can also be connected in conventional 24V mode.
- E. NATURAL GAS MODELS: Central Heating furnace designs are certified by the American Gas Association for both natural and L.P. gas. Limit setting and rating data were established and approved under standard rating conditions using American National Standards Institute standards.
- F. SAFE OPERATION: The Integrated System Control has solid state devices, which continuously monitor for presence of flame, when the system is in the heating mode of operation. Dual solenoid combination gas valve and regulator provide additional safety.
- G. QUICK HEATING: Durable, cycle tested, heavy gauge aluminized steel heat exchanger quickly transfers heat to provide warm conditioned air to the structure. Low energy power vent blower, to increase efficiency and provide a positive discharge of gas fumes to the outside.
- H. BURNERS: Multiport Inshot burners will give years of quiet and efficient service. All models can be converted to L.P. gas without changing burners.
- I. INTEGRATED SYSTEM CONTROL: Exclusively designed operational program provides total control of furnace limit sensors, blowers, gas valve, flame control and includes self diagnostics for ease of service. Also contains connection points for EAC and Humidifier hookup
- J. AIR DELIVERY: The variable speed blower motor has sufficient airflow for most heating and cooling requirements and will switch from heating to cooling speeds on demand from room thermostat. The blower door safety switch will prevent or terminate furnace operation when the blower door is removed.
- K. HOUSING: Heavy gauge steel and “wrap-around” cabinet construction is used in the cabinet with baked-on enamel finish for strength and beauty. The heat exchanger section of the cabinet is completely lined with foil faced fiberglass insulation. This results in quiet and efficient operation due to the excellent acoustical and insulating qualities of fiberglass. Built-in bottom pan and alternate bottom, left or right side return air connection provision.
- L. FEATURES AND GENERAL OPERATION: The XC95m High Efficiency Gas Furnaces utilize an Adaptive Heat Up Silicon Nitride Hot Surface Ignition system, which eliminates the waste of a constant burning pilot. The integrated system control lights the main burners upon a demand for heat from the room thermostat. Complete front service access. Low energy power venter Vent proving pressure switch.
- M. Variable speed ECM blower motor
- N. PVC Venting - 1 or 2 pipe option

## **2.03 THERMOSTATS**

- A. Manufacturers:
  - 1. Trane Inc; \_\_\_\_\_: [www.trane.com](http://www.trane.com).
- B. Room Thermostat: Low voltage, electric solid state microcomputer based room thermostat with remote sensor:
  - 1. Preferential rate control to minimize overshoot and deviation from setpoint.
  - 2. Thermostat display:
    - a. Actual room temperature.
    - b. System mode indication: heating, cooling, fan auto, off, and on, auto or on, off.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available and located correctly.
- C. Verify that proper fuel supply is available for connection.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions and requirements of authorities having jurisdiction.
- B. Install in accordance with NFPA 90A.
- C. Install gas fired furnaces in accordance with NFPA 54.
- D. Provide vent connections in accordance with NFPA 211.
- E. Pipe drain from humidifier to nearest floor drain.

**END OF SECTION**

**SECTION 23 8101**  
**TERMINAL HEAT TRANSFER UNITS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electric heaters.

**1.02 RELATED REQUIREMENTS**

- A. Section 23 0513 - Common Motor Requirements for HVAC Equipment.
- B. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections. Installation of room thermostats. Electrical supply to units.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide typical catalog of information including arrangements.
- C. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.04 QUALITY ASSURANCE**

**1.05 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturers warranty for fan-coil unit.

**PART 2 PRODUCTS**

**2.01 ELECTRIC UNIT HEATERS**

- A. Manufacturers:
  - 1. Trane Inc: [www.trane.com](http://www.trane.com).
- B. Assembly: UL listed and labelled assembly with terminal box and cover, and built-in controls.
- C. Heating Elements: Enclosed copper tube, aluminum finned element of coiled nickel-chrome resistance wire centered in tubes and embedded in refractory material.
- D. Cabinet: 0.0478 inch steel with easily removed front panel with integral air outlet and inlet grilles.
- E. Fan: Direct drive propeller type, statically and dynamically balanced, with fan guard.
- F. Motor: Permanently lubricated, sleeve bearings for horizontal models, ball bearings for vertical models.
- G. Control: Provide tamper proof thermostat.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install equipment exposed to finished areas after walls and ceiling are finished and painted. Do not damage equipment or finishes.
- C. Install electric heating equipment including devices furnished by manufacturer but not factory-mounted. Furnish copy of manufacturer's wiring diagram submittal. Install electrical wiring in accordance with manufacturer's submittals and Section 26 2717.

**END OF SECTION**

**SECTION 23 8127**  
**SMALL SPLIT-SYSTEM HEATING AND COOLING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Air cooled condensing units.

**1.02 RELATED REQUIREMENTS**

**1.03 REFERENCE STANDARDS**

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air Conditioning and Air-Source Heat Pump Equipment; Air-Conditioning, Heating, and Refrigeration Institute; 2008.
- B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; Air-Conditioning, Heating, and Refrigeration Institute; 2004.
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2013 (ANSI/ASHRAE Std 15).
- D. ASHRAE Std 23.1 - Methods of Testing for Rating Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Temperatures of the Refrigerant; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 2010.
- E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association; 2012.
- F. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems; National Fire Protection Association; 2012.
- G. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience and approved by manufacturer.

**1.06 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturers warranty for condensing units.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Trane Inc; XL20i - 4TTZ0048A & 4TTZ0060A: [www.trane.com](http://www.trane.com).

**2.02 SYSTEM DESIGN**

- A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
  - 1. Heating: Natural gas fired.
  - 2. Cooling: Outdoor electric condensing unit with evaporator coil in central ducted indoor unit.



3. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.

### **2.03 OUTDOOR UNITS**

- A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
  1. Comply with AHRI 210/240.
  2. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.
  3. Refrigerant: R-410A.
  4. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
  5. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.
- B. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
- C. Coil: Air-cooled, aluminum fins bonded to copper tubes.
- D. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gage ports, thermometer well (in liquid line).
  1. Provide thermostatic expansion valves.
- E. Operating Controls:
  1. Control by room thermostat to maintain room temperature setting.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available and in correct location.
- C. Verify that proper fuel supply is available for connection.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.
- B. Install in accordance with NFPA 90A and NFPA 90B.
- C. Install refrigeration systems in accordance with ASHRAE Std 15.

**END OF SECTION**

## **SECTION 23 8216**

### **AIR COILS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Refrigerant coils.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 23 2300 - Refrigerant Piping.
- B. Section 23 3100 - HVAC Ducts and Casings: Installation of duct coils.

##### **1.03 REFERENCE STANDARDS**

- A. AHRI 410 - Standard for Forced-Circulation Air-Cooling and Air-Heating Coils; Air-Conditioning, Heating, and Refrigeration Institute; 2001 (R2011).
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association; 2005.

##### **1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.

##### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

##### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect 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 MANUFACTURERS**

- A. Trane; COOLING COIL: [www.trane.com](http://www.trane.com).

##### **2.02 REFRIGERANT COILS**

- A. Manufacturers:
  - 1. Trane; COOLING COIL: [www.trane.com](http://www.trane.com).
- B. Tubes: 5/8 inch OD seamless copper or brass arranged in parallel or staggered pattern, expanded into fins, silver brazed joints.
- C. Fins: Aluminum or copper continuous plate type with full fin collars. Solder coat copper fin coils.
- D. Casing: Die formed channel frame of 16 gage, 0.0598 inch galvanized steel with 3/8 inch mounting holes on 3 inch centers. Provide tube supports for coils longer than 36 inches.
- E. Headers: Seamless copper or brass tubes with silver brazed joints.
- F. Liquid Distributors: Brass or copper venturi type distributor with seamless copper distributor tubes, 5/16 inch outside diameter; maximum 12 circuits per distributor.
- G. Testing: Air test under water at 300 psi for working pressure of 250 psi; clean, dehydrate, and seal with dry nitrogen charge.
- H. Configuration: Down feed with bottom suction to prevent trapping of oil.
- I. Fin Spacing: 8 fins per inch.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturers written instructions.
- B. Install in ducts and casings in accordance with SMACNA (DCS).
  - 1. Provide frames for maximum three coil sections.
  - 2. Arrange supports to avoid piercing drain pans.
  - 3. Provide airtight seal between coil and duct or casing.
  - 4. Refer to Section 23 3100.
- C. Protect coils to prevent damage to fins and flanges. Comb out bent fins.
- D. Install coils level. Install cleanable tube coils with 1:50 pitch.
- E. Make connections to coils with unions and flanges.
- F. Cooling Coils:
  - 1. Provide three break moisture eliminators of 24 gage, 0.0239 inch galvanized steel, where air velocity exceeds 500 ft/min.
  - 2. Provide drain pan and drain connection; fabricate from 20 gage, 0.0359 inch galvanized steel, extend 3 inches from face of entering air side, 6 inches from face of leaving air side, and 4 inches from face of eliminators. Pipe drain pans individually to floor drain with water seal trap.
- G. Refrigerant Coils: Provide sight glass in liquid line within 12 inches of coil. Refer to Section 23 2300.

**END OF SECTION**

## **SECTION 26 0519**

### **LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Single conductor building wire.
- B. Metal-clad cable.
- C. Wiring connectors.
- D. Electrical tape.
- E. Heat shrink tubing.
- F. Oxide inhibiting compound.
- G. Wire pulling lubricant.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Additional requirements for grounding conductors and grounding connectors.
- C. Section 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS: Identification products and requirements.
- D. Section 26 3100 - Photovoltaic Collectors: Additional wiring requirements for photovoltaic systems.
- E. Section 28 3100 - FIRE DETECTION AND ALARM: Fire alarm system conductors and cables.
- F. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

##### **1.03 REFERENCE STANDARDS**

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010.
- D. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2013.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- F. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); National Electrical Contractors Association; 2006.
- G. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; National Electrical Manufacturers Association; 2009 (ANSI/NEMA WC 70/ICEA S-95-658).
- H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).
- I. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- K. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- L. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- M. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

- N. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables; Current Edition, Including All Revisions.
- O. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- P. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
  - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
  - 3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

#### **1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- C. Field Quality Control Test Reports.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 6000 - Product Requirements, for additional provisions.

#### **1.06 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

### **PART 2 PRODUCTS**

#### **2.01 CONDUCTOR AND CABLE APPLICATIONS**

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

#### **2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Provide new conductors and cables manufactured not more than one year prior to installation.
- D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- E. Comply with NEMA WC 70.
- F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

- G. Conductors for Grounding and Bonding: Also comply with Section 26 0526.
- H. Conductor Material:
  - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
  - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B 787M unless otherwise indicated.
  - 3. Tinned Copper Conductors: Comply with ASTM B33.
- I. Minimum Conductor Size:
  - 1. Branch Circuits: 12 AWG.
    - a. Exceptions:
      - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
      - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
- J. Conductor Color Coding:
  - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
  - 2. Color Coding Method: Integrally colored insulation.
    - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
  - 3. Color Code:
    - a. 208Y/120 V, 3 Phase, 4 Wire System:
      - 1) Phase A: Black.
      - 2) Phase B: Red.
      - 3) Phase C: Blue.
      - 4) Neutral/Grounded: White.
    - b. Equipment Ground, All Systems: Green.

## **2.03 SINGLE CONDUCTOR BUILDING WIRE**

- A. Manufacturers:
  - 1. Copper Building Wire:
    - a. Cerro Wire LLC: [www.cerrowire.com](http://www.cerrowire.com).
    - b. Encore Wire Corporation: [www.encorewire.com](http://www.encorewire.com).
    - c. Southwire Company: [www.southwire.com](http://www.southwire.com).
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
  - 1. Feeders and Branch Circuits:
    - a. Size 10 AWG and Smaller: Solid.
    - b. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
  - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

## **2.04 UNDERGROUND FEEDER AND BRANCH-CIRCUIT CABLE**

- A. Manufacturers:
  - 1. Cerro Wire LLC: [www.cerrowire.com](http://www.cerrowire.com).
  - 2. Encore Wire Corporation: [www.encorewire.com](http://www.encorewire.com).
  - 3. Southwire Company: [www.southwire.com](http://www.southwire.com).
- B. Provide equipment grounding conductor unless otherwise indicated.
- C. Conductor Stranding:
  - 1. Size 10 AWG and Smaller: Solid.
  - 2. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.

- E. Cable Jacket: Listed and labeled as sunlight resistant.

## **2.05 METAL-CLAD CABLE**

- A. Manufacturers:
  - 1. AFC Cable Systems Inc: [www.afcweb.com](http://www.afcweb.com).
  - 2. Encore Wire Corporation: [www.encorewire.com](http://www.encorewire.com).
  - 3. Southwire Company: [www.southwire.com](http://www.southwire.com).
- B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- C. Conductor Stranding:
  - 1. Size 10 AWG and Smaller: Solid.
  - 2. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- F. Grounding: Full-size integral equipment grounding conductor.
- G. Armor: Steel, interlocked tape.

## **2.06 WIRING CONNECTORS**

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 26 0526.
- C. Wiring Connectors for Splices and Taps:
  - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
  - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- D. Wiring Connectors for Terminations:
  - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
  - 2. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
  - 3. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
  - 4. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
- E. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
  - 1. Manufacturers:
    - a. 3M: [www.3m.com](http://www.3m.com).
    - b. Ideal Industries, Inc: [www.idealindustries.com](http://www.idealindustries.com).
    - c. NSI Industries LLC: [www.nsiindustries.com](http://www.nsiindustries.com).
- F. Mechanical Connectors: Provide bolted type or set-screw type.
- G. Compression Connectors: Provide circumferential type or hex type crimp configuration.
- H. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.

## **2.07 WIRING ACCESSORIES**

- A. Electrical Tape:
  - 1. Manufacturers:

- a. 3M: [www.3m.com](http://www.3m.com).
  - b. Plymouth Rubber Europa: [www.plymouthrubber.com](http://www.plymouthrubber.com).
- 2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
- 3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
- 4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
- 5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
- C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
- D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 PREPARATION**

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

### **3.03 INSTALLATION**

- A. Circuiting Requirements:
  - 1. When circuit destination is indicated and routing is not shown, determine exact routing required.
  - 2. Arrange circuiting to minimize splices.
  - 3. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.
- D. Install metal-clad cable (Type MC) in accordance with NECA 120.
- E. Installation in Raceway:
  - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
  - 2. Pull all conductors and cables together into raceway at same time.
  - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
  - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.



- F. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- G. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
  - 1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.
  - 2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.
- H. Terminate cables using suitable fittings.
  - 1. Metal-Clad Cable (Type MC):
    - a. Use listed fittings.
    - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- I. Install conductors with a minimum of 12 inches of slack at each outlet.
- J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- L. Make wiring connections using specified wiring connectors.
  - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
  - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
  - 3. Do not remove conductor strands to facilitate insertion into connector.
  - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
  - 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  - 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
  - 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
    - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
  - 2. Damp Locations: Use heat shrink tubing.
  - 3. Wet Locations: Use heat shrink tubing.
- N. Insulate ends of spare conductors using vinyl insulating electrical tape.
- O. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- Q. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

### **3.04 FIELD QUALITY CONTROL**

- A. Perform inspection, testing, and adjusting in accordance with Section 01 4000.

- B. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
- C. Correct deficiencies and replace damaged or defective conductors and cables.

**END OF SECTION**

**SECTION 26 0526**  
**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS: Identification products and requirements.
- C. Section 26 3100 - Photovoltaic Collectors: Additional grounding and bonding requirements for photovoltaic systems.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; National Electrical Manufacturers Association; 2007.
- C. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).
- D. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Verify exact locations of underground metal water service pipe entrances to building.
  - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
  - 3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

**1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- C. Field quality control test reports.
- D. Project Record Documents: Record actual locations of grounding electrode system components and connections.

**1.06 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.

## **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

## **PART 2 PRODUCTS**

### **2.01 GROUNDING AND BONDING REQUIREMENTS**

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- D. Grounding Electrode System:
  - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
    - a. Provide continuous grounding electrode conductors without splice or joint.
    - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
  - 2. Metal Underground Water Pipe(s):
    - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
    - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
    - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
  - 3. Concrete-Encased Electrode:
    - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
  - 4. Ground Rod Electrode(s):
    - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
    - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
    - c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
  - 5. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
  - 6. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
    - a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
    - b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
    - c. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.
  - 7. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.

- E. Service-Supplied System Grounding:
  - 1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
  - 2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.
- F. Grounding for Separate Building or Structure Supplied by Feeder(s) or Branch Circuits:
  - 1. Provide equipment grounding conductor routed with supply conductors.
- G. Bonding and Equipment Grounding:
  - 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
  - 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
  - 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
  - 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
  - 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
  - 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
  - 7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
    - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
    - b. Metal gas piping.
- H. Communications Systems Grounding and Bonding:
  - 1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
  - 2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
    - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
    - b. Raceway Size: 3/4 inch unless otherwise indicated or required.
    - c. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
    - d. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.
- I. Photovoltaic Systems: Also comply with Section 26 3100.

## **2.02 GROUNDING AND BONDING COMPONENTS**

- A. General Requirements:
  - 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
  - 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in addition to requirements of Section 26 0519:
  - 1. Use insulated copper conductors unless otherwise indicated.
    - a. Exceptions:
      - 1) Use bare copper conductors where installed underground in direct contact with earth.

- 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
  2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
  3. Unless otherwise indicated, use mechanical connectors or compression connectors for accessible connections.
  4. Manufacturers - Mechanical and Compression Connectors:
    - a. Burndy: [www.burndy.com](http://www.burndy.com).
    - b. Harger Lightning & Grounding: [www.harger.com](http://www.harger.com).
    - c. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
  5. Manufacturers - Exothermic Welded Connections:
    - a. Burndy: [www.burndy.com](http://www.burndy.com).
    - b. Cadweld, a brand of Erico International Corporation: [www.erico.com](http://www.erico.com).
    - c. ThermOweld, a brand of Continental Industries, Inc: [www.thermoweld.com](http://www.thermoweld.com).
- D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
  2. Holes for Connections: As indicated or as required for connections to be made.
  3. Manufacturers:
    - a. Erico International Corporation: [www.erico.com](http://www.erico.com).
    - b. Harger Lightning & Grounding: [www.harger.com](http://www.harger.com).
    - c. ThermOweld, a brand of Continental Industries, Inc: [www.thermoweld.com](http://www.thermoweld.com).
- E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
  2. Material: Copper-bonded (copper-clad) steel.
  3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.
  4. Manufacturers:
    - a. Erico International Corporation: [www.erico.com](http://www.erico.com).
    - b. Galvan Industries, Inc: [www.galvanelectrical.com](http://www.galvanelectrical.com).
    - c. Harger Lightning & Grounding: [www.harger.com](http://www.harger.com).

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as shown on the drawings.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
  1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
  2. Indoor Installations: Unless otherwise indicated, install with 4 inches of top of rod exposed.

- D. Make grounding and bonding connections using specified connectors.
  - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
  - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
  - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
  - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 0553.

### **3.03 FIELD QUALITY CONTROL**

- A. Perform inspection, testing, and adjusting in accordance with Section 01 4000.
- B. Inspect and test in accordance with NETA ATS except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.13.
- D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

**END OF SECTION**

## **SECTION 26 0529**

### **HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 05 5000 - Metal Fabrications: Materials and requirements for fabricated metal supports.
- C. Section 26 0534 - Conduit: Additional support and attachment requirements for conduits.
- D. Section 26 0537 - BOXES: Additional support and attachment requirements for boxes.
- E. Section 26 3100 - Photovoltaic Collectors: Photovoltaic module mounting systems.
- F. Section 26 5100 - INTERIOR LIGHTING: Additional support and attachment requirements for interior luminaires.
- G. Section 26 5600 - EXTERIOR LIGHTING: Additional support and attachment requirements for exterior luminaires.

##### **1.03 REFERENCE STANDARDS**

- A. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.
- B. MFMA-4 - Metal Framing Standards Publication; Metal Framing Manufacturers Association; 2004.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- D. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

##### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
  - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
  - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
  - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
  - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

##### **1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.



- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

## **1.06 QUALITY ASSURANCE**

- A. Comply with NFPA 70.
- B. Comply with applicable building code.

## **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

# **PART 2 PRODUCTS**

## **2.01 SUPPORT AND ATTACHMENT COMPONENTS**

- A. General Requirements:
  - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
  - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
  - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
  - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
  - 5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
  - 6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
    - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
    - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Materials for Metal Fabricated Supports: Comply with Section 05 5000.
- C. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
  - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
  - 2. Conduit Clamps: Bolted type unless otherwise indicated.
  - 3. Manufacturers:
    - a. Cooper Crouse-Hinds, a division of Eaton Corporation: [www.cooperindustries.com](http://www.cooperindustries.com).
    - b. Erico International Corporation: [www.erico.com](http://www.erico.com).
    - c. O-Z/Gedney, a brand of Emerson Industrial Automation: [www.emersonindustrial.com](http://www.emersonindustrial.com).
    - d. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
- D. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
  - 1. Manufacturers:
    - a. Cooper Crouse-Hinds, a division of Eaton Corporation: [www.cooperindustries.com](http://www.cooperindustries.com).
    - b. Erico International Corporation: [www.erico.com](http://www.erico.com).
    - c. O-Z/Gedney, a brand of Emerson Industrial Automation: [www.emersonindustrial.com](http://www.emersonindustrial.com).
    - d. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).

- E. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
  - 1. Comply with MFMA-4.
  - 2. Channel Material:
    - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
    - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
  - 3. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch.
  - 4. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
  - 5. Manufacturers:
    - a. Cooper B-Line, a division of Eaton Corporation: [www.cooperindustries.com](http://www.cooperindustries.com).
    - b. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
    - c. Unistrut, a brand of Atkore International Inc: [www.unistrut.com](http://www.unistrut.com).
    - d. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
- F. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
  - 1. Minimum Size, Unless Otherwise Indicated or Required:
- G. Anchors and Fasteners:
  - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
  - 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
  - 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
  - 4. Hollow Masonry: Use toggle bolts.
  - 5. Hollow Stud Walls: Use toggle bolts.
  - 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
  - 7. Sheet Metal: Use sheet metal screws.
  - 8. Wood: Use wood screws.
  - 9. Plastic and lead anchors are not permitted.
  - 10. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    - a. Comply with MFMA-4.
    - b. Channel Material: Use galvanized steel.
    - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
  - 11. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.
  - 12. Manufacturers - Mechanical Anchors:
    - a. Hilti, Inc: [www.us.hilti.com](http://www.us.hilti.com).
    - b. ITW Red Head, a division of Illinois Tool Works, Inc: [www.itwredhead.com](http://www.itwredhead.com).
    - c. Powers Fasteners, Inc: [www.powers.com](http://www.powers.com).

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.
- C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

- D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- E. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- F. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- H. Equipment Support and Attachment:
  - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
  - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
  - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
  - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- I. Conduit Support and Attachment: Also comply with Section 26 0534.
- J. Box Support and Attachment: Also comply with Section 26 0537.
- K. Interior Luminaire Support and Attachment: Also comply with Section 26 5100.
- L. Exterior Luminaire Support and Attachment: Also comply with Section 26 5600.
- M. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- N. Secure fasteners according to manufacturer's recommended torque settings.
- O. Remove temporary supports.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

### **END OF SECTION**

## **SECTION 26 0534**

### **CONDUIT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Galvanized steel rigid metal conduit (RMC).
- B. PVC-coated galvanized steel rigid metal conduit (RMC).
- C. Flexible metal conduit (FMC).
- D. Liquidtight flexible metal conduit (LFMC).
- E. Electrical metallic tubing (EMT).
- F. Rigid polyvinyl chloride (PVC) conduit.
- G. Conduit fittings.
- H. Accessories.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- C. Section 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS.
- D. Section 26 0537 - BOXES.
- E. Section 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS: Identification products and requirements.
- F. Section 27 1005 - STRUCTURED CABLING FOR VOICE AND DATA - INSIDE-PLANT: Additional requirements for communications systems conduits.
- G. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

##### **1.03 REFERENCE STANDARDS**

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.
- B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); National Electrical Contractors Association; 2006.
- E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); National Electrical Contractors Association; 2003.
- F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2012 (ANSI/NEMA FB 1).
- G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; National Electrical Manufacturers Association; 2005.
- H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; National Electrical Manufacturers Association; 2013.
- I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; National Electrical Manufacturers Association; 2013.
- J. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- L. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- M. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

- N. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.
- O. UL 651 - Schedule 40 and 80 Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- P. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
  - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
  - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
  - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
  - 5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

#### **1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- C. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

#### **1.06 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

### **PART 2 PRODUCTS**

#### **2.01 CONDUIT APPLICATIONS**

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
  - 1. Under Slab on Grade: Use rigid PVC conduit.
  - 2. Exterior, Direct-Buried: Use rigid PVC conduit.
  - 3. Exterior, Embedded Within Concrete: Use galvanized steel rigid metal conduit.
  - 4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
  - 5. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
  - 6. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils

- report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.
7. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.
- D. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).
  - E. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).
  - F. Exposed, Interior, Not Subject to Physical Damage: Use electrical metallic tubing (EMT).
  - G. Exposed, Exterior: Use galvanized steel rigid metal conduit.
  - H. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
    1. Maximum Length: 6 feet.
  - I. Connections to Vibrating Equipment:
    1. Dry Locations: Use flexible metal conduit.
    2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
    3. Maximum Length: 6 feet unless otherwise indicated.

## **2.02 CONDUIT REQUIREMENTS**

- A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Minimum Conduit Size, Unless Otherwise Indicated:
  1. Branch Circuits: 1/2 inch (16 mm) trade size.
- D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

## **2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)**

- A. Manufacturers:
  1. Allied Tube & Conduit: [www.alliedeg.com](http://www.alliedeg.com).
  2. Republic Conduit: [www.republic-conduit.com](http://www.republic-conduit.com).
  3. Wheatland Tube Company: [www.wheatland.com](http://www.wheatland.com).
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
  1. Manufacturers:
    - a. Bridgeport Fittings Inc: [www.bptfittings.com](http://www.bptfittings.com).
    - b. O-Z/Gedney, a brand of Emerson Industrial Automation: [www.emersonindustrial.com](http://www.emersonindustrial.com).
    - c. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
  2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  3. Material: Use steel or malleable iron.
  4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

## **2.04 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)**

- A. Manufacturers:
  1. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
  2. Robroy Industries: [www.robroy.com](http://www.robroy.com).
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- C. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil.

- D. PVC-Coated Fittings:
  - 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
  - 2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
  - 3. Material: Use steel or malleable iron.
  - 4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil.
- E. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil.

## **2.05 FLEXIBLE METAL CONDUIT (FMC)**

- A. Manufacturers:
  - 1. AFC Cable Systems, Inc: [www.afcweb.com](http://www.afcweb.com).
  - 2. Electri-Flex Company: [www.electriflex.com](http://www.electriflex.com).
  - 3. International Metal Hose: [www.metalhose.com](http://www.metalhose.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- C. Fittings:
  - 1. Manufacturers:
    - a. Bridgeport Fittings Inc: [www.bptfittings.com](http://www.bptfittings.com).
    - b. O-Z/Gedney, a brand of Emerson Industrial Automation: [www.emersonindustrial.com](http://www.emersonindustrial.com).
    - c. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
    - d. Substitutions: See Section 01 6000 - Product Requirements.
  - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 3. Material: Use steel or malleable iron.

## **2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)**

- A. Manufacturers:
  - 1. AFC Cable Systems, Inc: [www.afcweb.com](http://www.afcweb.com).
  - 2. Electri-Flex Company: [www.electriflex.com](http://www.electriflex.com).
  - 3. International Metal Hose: [www.metalhose.com](http://www.metalhose.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:
  - 1. Manufacturers:
    - a. Bridgeport Fittings Inc: [www.bptfittings.com](http://www.bptfittings.com).
    - b. O-Z/Gedney, a brand of Emerson Industrial Automation: [www.emersonindustrial.com](http://www.emersonindustrial.com).
    - c. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
    - d. Substitutions: See Section 01 6000 - Product Requirements.
  - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 3. Material: Use steel or malleable iron.

## **2.07 ELECTRICAL METALLIC TUBING (EMT)**

- A. Manufacturers:
  - 1. Allied Tube & Conduit: [www.alliedeg.com](http://www.alliedeg.com).
  - 2. Republic Conduit: [www.republic-conduit.com](http://www.republic-conduit.com).
  - 3. Wheatland Tube Company: [www.wheatland.com](http://www.wheatland.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.

- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
  - 1. Manufacturers:
    - a. Bridgeport Fittings Inc: [www.bptfittings.com](http://www.bptfittings.com).
    - b. O-Z/Gedney, a brand of Emerson Industrial Automation: [www.emersonindustrial.com](http://www.emersonindustrial.com).
    - c. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
    - d. Substitutions: See Section 01 6000 - Product Requirements.
  - 2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 3. Material: Use steel or malleable iron.
  - 4. Connectors and Couplings: Use compression (gland) or set-screw type.
    - a. Do not use indenter type connectors and couplings.
  - 5. Damp or Wet Locations (where permitted): Use fittings listed for use in wet locations.

## **2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT**

- A. Manufacturers:
  - 1. Cantex Inc: [www.cantexinc.com](http://www.cantexinc.com).
  - 2. Carlon, a brand of Thomas & Betts Corporation: [www.carlon.com](http://www.carlon.com).
  - 3. JM Eagle: [www.jmeagle.com](http://www.jmeagle.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- C. Fittings:
  - 1. Manufacturer: Same as manufacturer of conduit to be connected.
  - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

## **2.09 ACCESSORIES**

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as shown on drawings.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.
- E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- F. Conduit Routing:



1. When conduit destination is indicated and routing is not shown, determine exact routing required.
  2. Conceal all conduits unless specifically indicated to be exposed.
  3. Conduits in the following areas may be exposed, unless otherwise indicated:
    - a. Electrical rooms.
    - b. Mechanical equipment rooms.
  4. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
  5. Arrange conduit to maintain adequate headroom, clearances, and access.
  6. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
  7. Arrange conduit to provide no more than 150 feet between pull points.
  8. Route conduits above water and drain piping where possible.
  9. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
  10. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
    - a. Heaters.
    - b. Hot water piping.
    - c. Flues.
  11. Group parallel conduits in the same area together on a common rack.
- G. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
  2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
  3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
  4. Use conduit strap to support single surface-mounted conduit.
    - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
  5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
  6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
  7. Use of wire for support of conduits is not permitted.
  8. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.
- H. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
  2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
  3. Use suitable adapters where required to transition from one type of conduit to another.
  4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
  5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
  6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
  7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- I. Penetrations:

1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
  2. Make penetrations perpendicular to surfaces unless otherwise indicated.
  3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
  4. Conceal bends for conduit risers emerging above ground.
  5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
  6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
  7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
  8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- J. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
    - a. Underground, Exterior: 24 inches.
  2. Provide underground warning tape in accordance with Section 26 0553 along entire conduit length for service entrance where not concrete-encased.
- K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
  2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
  3. Where conduits are subject to earth movement by settlement or frost.
- L. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
  2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- M. Provide grounding and bonding in accordance with Section 26 0526.
- N. Identify conduits in accordance with Section 26 0553.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.
- D. Correct deficiencies and replace damaged or defective conduits.

### **3.04 CLEANING**

- A. Clean interior of conduits to remove moisture and foreign matter.

### **3.05 PROTECTION**

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

**END OF SECTION**



## **SECTION 26 0537**

### **BOXES**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- C. Section 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS.
- D. Section 26 0534 - Conduit:
  - 1. Conduit bodies and other fittings.
- E. Section 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS: Identification products and requirements.
- F. Section 26 2726 - WIRING DEVICES:
  - 1. Wall plates.
  - 2. Additional requirements for locating boxes for wiring devices.
- G. Section 27 1005 - STRUCTURED CABLING FOR VOICE AND DATA - INSIDE-PLANT: Additional requirements for communications systems outlet boxes.

##### **1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; National Electrical Contractors Association; 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2012 (ANSI/NEMA FB 1).
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2013 (ANSI/NEMA OS 1).
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

##### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
  - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.

4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

#### **1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for outlet and device boxes and junction and pull boxes.
- C. Project Record Documents: Record actual locations for outlet and device boxes, junction boxes, and pull boxes.

#### **1.06 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

### **PART 2 PRODUCTS**

#### **2.01 BOXES**

- A. General Requirements:
  1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
  2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
  3. Provide products listed, classified, and labeled as suitable for the purpose intended.
  4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
  5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
  1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
  2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
  3. Use suitable concrete type boxes where flush-mounted in concrete.
  4. Use suitable masonry type boxes where flush-mounted in masonry walls.
  5. Use raised covers suitable for the type of wall construction and device configuration where required.
  6. Use shallow boxes where required by the type of wall construction.
  7. Do not use "through-wall" boxes designed for access from both sides of wall.
  8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
  9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
  10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
  11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.

12. Minimum Box Size, Unless Otherwise Indicated:
  - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
  - b. Communications Systems Outlets: Comply with Section 27 1005.
  - c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
13. Wall Plates: Comply with Section 26 2726.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
  1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
  2. NEMA 250 Environment Type, Unless Otherwise Indicated:
    - a. Indoor Clean, Dry Locations: Type 1, painted steel.
    - b. Outdoor Locations: Type 3R, painted steel.
  3. Junction and Pull Boxes Larger Than 100 cubic inches:
    - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Box Locations:
  1. Locate boxes to be accessible.
  2. Locate boxes as required for devices installed under other sections or by others.
    - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 2726.
    - b. Communications Systems Outlets: Comply with Section 27 1005.
  3. Locate boxes so that wall plates do not span different building finishes.
  4. Locate boxes so that wall plates do not cross masonry joints.
  5. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
  6. Fire-Resistance-Rated Walls: Install flush-mounted boxes such that the required fire-resistance will not be reduced.
- E. Box Supports:
  1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
  2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
  3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
- F. Install boxes plumb and level.
- G. Flush-Mounted Boxes:
  1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
  2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.

- 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- H. Install boxes as required to preserve insulation integrity.
- I. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- J. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- K. Close unused box openings.
- L. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- M. Provide grounding and bonding in accordance with Section 26 0526.
- N. Identify boxes in accordance with Section 26 0553.

### **3.02 CLEANING**

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

### **3.03 PROTECTION**

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

**END OF SECTION**

**SECTION 26 0553**  
**IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Floor marking tape.
- G. Warning signs and labels.

**1.02 RELATED REQUIREMENTS**

- A. Section 09 9000 - Painting and Coating.
- B. Section 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- C. Section 26 2726 - Wiring Devices: Device and wallplate finishes; factory pre-marked wallplates.
- D. Section 26 3100 - Photovoltaic Collectors: Additional identification requirements for photovoltaic systems.
- E. Section 27 1005 - Structured Cabling for Voice and Data: Identification for communications cabling and devices.

**1.03 REFERENCE STANDARDS**

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 70E - Standard for Electrical Safety in the Workplace; 2012.
- E. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
  - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
  - 2. Do not install identification products until final surface finishes and painting are complete.

**1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

**1.06 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.

**1.07 FIELD CONDITIONS**

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.



## PART 2 PRODUCTS

### 2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
  - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
    - a. Panelboards:
      - 1) Identify voltage and phase.
      - 2) Identify power source and circuit number. Include location when not within sight of equipment.
      - 3) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
      - 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
    - b. Transformers:
      - 1) Identify kVA rating.
      - 2) Identify voltage and phase for primary and secondary.
      - 3) Identify power source and circuit number. Include location.
      - 4) Identify load(s) served. Include location when not within sight of equipment.
    - c. Enclosed switches, circuit breakers, and motor controllers:
      - 1) Identify voltage and phase.
      - 2) Identify power source and circuit number. Include location when not within sight of equipment.
      - 3) Identify load(s) served. Include location when not within sight of equipment.
    - d. Time Switches:
      - 1) Identify load(s) served and associated circuits controlled. Include location.
    - e. Enclosed Contactors:
      - 1) Identify ampere rating.
      - 2) Identify voltage and phase.
      - 3) Identify load(s) and associated circuits controlled. Include location.
  - 2. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
  - 3. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
  - 4. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
  - 5. Use floor marking tape and warning labels to identify required equipment working clearances where indicated or where required by the authority having jurisdiction.
  - 6. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
    - a. Minimum Size: 3.5 by 5 inches.
    - b. Legend: Provide custom legend in accordance with NFPA 70E based on equipment-specific data:
      - 1) Include orange header that reads "WARNING" where calculated incident energy is less than 40 calories per square cm.
      - 2) Include red header that reads "DANGER" where calculated incident energy is 40 calories per square cm or greater.
      - 3) Include the text "Arc Flash and Shock Hazard; Appropriate PPE Required" or approved equivalent.
      - 4) Include the following information:
        - (a) Arc flash protection boundary.
        - (b) Incident energy.

- (c) Hazard/risk category.
  - (d) PPE (personnel protective equipment) requirements.
  - (e) Nominal voltage.
  - (f) Shock hazard condition.
  - (g) Limited approach boundary.
  - (h) Restricted approach boundary.
  - (i) Prohibited approach boundary.
  - (j) Equipment identification.
  - (k) Date calculations were performed.
- B. Identification for Conductors and Cables:
- 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
  - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
  - 3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
    - a. At each source and load connection.
    - b. Within boxes when more than one circuit is present.
    - c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
  - 4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
- C. Identification for Raceways:
- 1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet.
  - 2. Use identification labels or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.
  - 3. Use identification labels or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
  - 4. Use underground warning tape to identify underground raceways.
- D. Identification for Boxes:
- 1. Use voltage markers to identify highest voltage present.
  - 2. Use voltage markers or color coded boxes to identify systems other than normal power system.
    - a. Color-Coded Boxes: Field-painted in accordance with Section 09 9000 per the same color code used for raceways.
      - 1) Fire Alarm System: Red.
    - b. For exposed boxes in public areas, do not color code.
  - 3. Use identification labels to identify circuits enclosed.
    - a. For exposed boxes in public areas, use only identification labels.
- E. Identification for Devices:
- 1. Identification for Communications Devices: Comply with Section 27 1005.
  - 2. Wiring Device and Wallplate Finishes: Comply with Section 26 2726.
  - 3. Use identification label to identify fire alarm system devices.
  - 4. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
    - a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.
  - 5. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

F. Identification for Photovoltaic Systems: Comply with Section 26 3100

## **2.02 IDENTIFICATION NAMEPLATES AND LABELS**

### **A. Identification Nameplates:**

1. Manufacturers:
  - a. Brimar Industries, Inc: [www.brimar.com](http://www.brimar.com).
  - b. Kolbi Pipe Marker Co: [www.kolbipipemarkers.com](http://www.kolbipipemarkers.com).
  - c. Seton Identification Products: [www.seton.com](http://www.seton.com).
2. Materials:
  - a. Indoor Clean, Dry Locations: Use plastic nameplates.
  - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
4. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

### **B. Identification Labels:**

1. Manufacturers:
  - a. Brady Corporation: [www.bradyid.com](http://www.bradyid.com).
  - b. Brother International Corporation: [www.brother-usa.com](http://www.brother-usa.com).
  - c. Panduit Corp: [www.panduit.com](http://www.panduit.com).
2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

### **C. Format for Equipment Identification:**

1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
  - a. System designation where applicable:
    - 1) Fire Alarm System: Identify with text "FIRE ALARM".
  - b. Equipment designation or other approved description.
  - c. Other information as indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
  - a. System Designation: 1 inch.
  - b. Equipment Designation: 1/2 inch.
  - c. Other Information: 1/4 inch.
5. Color:
  - a. Normal Power System: White text on black background.
  - b. Fire Alarm System: White text on red background.

### **D. Format for General Information and Operating Instructions:**

1. Minimum Size: 1 inch by 2.5 inches.
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/4 inch.
5. Color: Black text on white background unless otherwise indicated.
  - a. Exceptions:
    - 1) Provide white text on red background for general information or operational instructions for fire alarm systems.

### **E. Format for Caution and Warning Messages:**

1. Minimum Size: 2 inches by 4 inches.

2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
  3. Text: All capitalized unless otherwise indicated.
  4. Minimum Text Height: 1/2 inch.
  5. Color: Black text on yellow background unless otherwise indicated.
- F. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
  2. Legend: Power source and circuit number or other designation indicated.
    - a. Include voltage and phase.
  3. Text: All capitalized unless otherwise indicated.
  4. Minimum Text Height: 3/16 inch.
  5. Color: Black text on clear background.
- G. Format for Control Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
  2. Legend: Load controlled or other designation indicated.
  3. Text: All capitalized unless otherwise indicated.
  4. Minimum Text Height: 3/16 inch.
  5. Color: Black text on clear background.
- H. Format for Fire Alarm Device Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
  2. Legend: Designation indicated and device zone or address.
  3. Text: All capitalized unless otherwise indicated.
  4. Minimum Text Height: 3/16 inch.
  5. Color: Red text on white background.

## **2.03 WIRE AND CABLE MARKERS**

- A. Manufacturers:
1. Brady Corporation: [www.bradyid.com](http://www.bradyid.com).
  2. HellermannTyton: [www.hellermannntyton.com](http://www.hellermannntyton.com).
  3. Panduit Corp: [www.panduit.com](http://www.panduit.com).
  4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- D. Legend: Power source and circuit number or other designation indicated.
- E. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- F. Minimum Text Height: 1/8 inch.
- G. Color: Black text on white background unless otherwise indicated.

## **2.04 VOLTAGE MARKERS**

- A. Manufacturers:
1. Brady Corporation: [www.bradyid.com](http://www.bradyid.com).
  2. Brimar Industries, Inc: [www.brimar.com](http://www.brimar.com).
  3. Seton Identification Products: [www.seton.com](http://www.seton.com).
  4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
- C. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

- D. Minimum Size:
  - 1. Markers for Equipment: 1 1/8 by 4 1/2 inches.
  - 2. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
  - 3. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
  - 4. Markers for Junction Boxes: 1/2 by 2 1/4 inches.
- E. Legend:
  - 1. Markers for Voltage Identification: Highest voltage present.
  - 2. Markers for System Identification:
    - a. Other Systems: Type of service.
- F. Color: Black text on orange background unless otherwise indicated.

## **2.05 UNDERGROUND WARNING TAPE**

- A. Manufacturers:
  - 1. Brady Corporation: [www.bradyid.com](http://www.bradyid.com).
  - 2. Brimar Industries, Inc: [www.brimar.com](http://www.brimar.com).
  - 3. Seton Identification Products: [www.seton.com](http://www.seton.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Materials: Use foil-backed detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- C. Foil-backed Detectable Type Tape: 3 inches wide, with minimum thickness of 5 mil, unless otherwise required for proper detection.
- D. Legend: Type of service, continuously repeated over full length of tape.
- E. Color:
  - 1. Tape for Buried Power Lines: Black text on red background.
  - 2. Tape for Buried Communication, Alarm, and Signal Lines: Black text on orange background.

## **2.06 FLOOR MARKING TAPE**

- A. Manufacturers:
  - 1. Brady Corporation: [www.bradyid.com](http://www.bradyid.com).
  - 2. Brimar Industries, Inc: [www.brimar.com](http://www.brimar.com).
  - 3. Seton Identification Products: [www.seton.com](http://www.seton.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlamine, 3 inches wide, with alternating black and white stripes.

## **2.07 WARNING SIGNS AND LABELS**

- A. Manufacturers:
  - 1. Brimar Industries, Inc: [www.brimar.com](http://www.brimar.com).
  - 2. Clarion Safety Systems, LLC: [www.clarionsafety.com](http://www.clarionsafety.com).
  - 3. Seton Identification Products: [www.seton.com](http://www.seton.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- C. Warning Signs:
  - 1. Materials:
    - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
    - b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
  - 2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
  - 3. Minimum Size: 7 by 10 inches unless otherwise indicated.
- D. Warning Labels:

1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches unless otherwise indicated.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
  1. Surface-Mounted Equipment: Enclosure front.
  2. Flush-Mounted Equipment: Inside of equipment door.
  3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
  4. Elevated Equipment: Legible from the floor or working platform.
  5. Interior Components: Legible from the point of access.
  6. Conduits: Legible from the floor.
  7. Boxes: Outside face of cover.
  8. Conductors and Cables: Legible from the point of access.
  9. Devices: Inside face of cover in public spaces. Outside face of cover for other spaces.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
- G. Secure rigid signs using stainless steel screws.
- H. Mark all handwritten text, where permitted, to be neat and legible.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

**END OF SECTION**

**SECTION 26 0923**  
**LIGHTING CONTROL DEVICES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Occupancy sensors.
- B. Time switches.
- C. Outdoor photo controls.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- B. Section 26 0537 - BOXES.
- C. Section 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS: Identification products and requirements.
- D. Section 26 2726 - WIRING DEVICES: Devices for manual control of lighting, including wall switches and wall dimmers.
  - 1. Includes finish requirements for wall controls specified in this section.
- E. Section 26 5100 - INTERIOR LIGHTING.
- F. Section 26 5600 - EXTERIOR LIGHTING.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; National Electrical Contractors Association; 2010.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.
- D. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 773A - Nonindustrial Photoelectric Switches for Lighting Control; Current Edition, Including All Revisions.
- F. UL 916 - Energy Management Equipment; Current Edition, Including All Revisions.
- G. UL 917 - Clock-Operated Switches; Current Edition, Including All Revisions.
- H. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
  - 2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
  - 3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
  - 4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- B. Sequencing:
  - 1. Do not install lighting control devices until final surface finishes and painting are complete.

**1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

- B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
  - 1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.
- C. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Operation and Maintenance Data: Include detailed information on device programming and setup.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 6000 - Product Requirements, for additional provisions.
- F. Project Record Documents: Record actual installed locations and settings for lighting control devices.

#### **1.06 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.

#### **1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

#### **1.08 FIELD CONDITIONS**

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

#### **1.09 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for all occupancy sensors.

### **PART 2 PRODUCTS**

#### **2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS**

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

#### **2.02 OCCUPANCY SENSORS**

- A. Manufacturers:
  - 1. Hubbell Building Automation, Inc: [www.hubbellautomation.com](http://www.hubbellautomation.com)
  - 2. Lutron Electronics Company, Inc: [www.lutron.com](http://www.lutron.com).
  - 3. WattStopper: [www.wattstopper.com](http://www.wattstopper.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. All Occupancy Sensors:
  - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
  - 2. Sensor Technology:
    - a. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
  - 3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
  - 4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.



5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
  6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.
  7. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
  8. Sensitivity: Field adjustable.
  9. Adaptive Technology: Field selectable; capable of self-adjusting sensitivity and time delay according to conditions.
  10. Integral Photocell: For field selectable and adjustable inhibition of automatic turn-on of load when ambient lighting is above the selected level.
  11. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
  12. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on the drawings.
  13. Where wired sensors are indicated, wireless sensors are acceptable provided that all components and wiring modifications necessary for proper operation are included.
  14. Wireless Sensors:
    - a. RF Range: 30 feet through typical construction materials.
    - b. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of CFR, Title 47, Part 15, for Class B application.
    - c. Power: Battery-operated with minimum ten-year battery life.
- C. Wall Switch Occupancy Sensors:
1. All Wall Switch Occupancy Sensors:
    - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
    - b. Unless otherwise indicated or required to control the load indicated on the drawings, provide line voltage units with self-contained relay.
    - c. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
    - d. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
    - e. Finish: Match finishes specified for wiring devices in Section 26 2726, unless otherwise indicated.
  2. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.
- D. Wall Dimmer Occupancy Sensors:
1. General Requirements:
    - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated dimming control capability, and no leakage current to load in off mode.
    - b. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).
    - c. Manual-Off Override Control Capability: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
    - d. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472; type and rating suitable for load controlled.
    - e. Provide field adjustable dimming preset for occupied state.

- f. Finish: Match finishes specified for wiring devices in Section 26 2726, unless otherwise indicated.
- E. Ceiling Mounted Occupancy Sensors:
  - 1. All Ceiling Mounted Occupancy Sensors:
    - a. Description: Low profile occupancy sensors designed for ceiling installation.
    - b. Unless otherwise indicated or required to control the load indicated on the drawings, provide low voltage units, for use with separate compatible accessory power packs.
    - c. Provide field selectable setting for disabling LED motion detector visual indicator.
    - d. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
  - 2. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
    - a. Standard Range Sensors: Capable of detecting motion within an area of 450 square feet at a mounting height of 9 feet, with a field of view of 360 degrees.
- F. Power Packs for Low Voltage Occupancy Sensors:
  - 1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
  - 2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on the drawings.
  - 3. Input Supply Voltage: Dual rated for 120/277 V ac.
  - 4. Load Rating: As required to control the load indicated on the drawings.
- G. Power Packs for Wireless Occupancy Sensors:
  - 1. Description: Plenum rated, self-contained relay compatible with specified wireless occupancy sensors for switching of line voltage loads.
  - 2. Input Supply Voltage: Dual rated for 120/277 V ac.
  - 3. Load Rating: As required to control the load indicated on the drawings.

## 2.03 TIME SWITCHES

- A. Manufacturers:
  - 1. Intermatic, Inc: [www.intermatic.com](http://www.intermatic.com).
  - 2. Tork, a division of NSI Industries LLC: [www.tork.com](http://www.tork.com).
  - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Digital Electronic Time Switches:
  - 1. Description: Factory-assembled solid state programmable controller with LCD display, listed and labeled as complying with UL 916 or UL 917.
  - 2. Program Capability:
    - a. Astronomic Time Switches: Two channel, capable of different schedule for each day of the week with additional holiday schedule available to override normal schedule for selected days and field-configurable astronomic feature to automatically adjust for seasonal changes in sunrise and sunset times.
  - 3. Schedule Capacity: Not less than 16 programmable on/off operations.
  - 4. Provide automatic daylight savings time and leap year compensation.
  - 5. Provide power outage backup to retain programming and maintain clock.
  - 6. Manual override: Capable of overriding current schedule both permanently and temporarily until next scheduled event.
  - 7. Provide remote photocell input with light level adjustment.
  - 8. Input Supply Voltage: As indicated on the drawings.
  - 9. Output Switch Configuration: As required to control the load indicated on the drawings.
  - 10. Output Switch Contact Ratings: As required to control the load indicated on the drawings.
  - 11. Provide lockable enclosure; environmental type per NEMA 250 as specified for the following installation locations:
    - a. Indoor clean, dry locations: Type 1.

## **2.04 OUTDOOR PHOTO CONTROLS**

- A. Manufacturers:
  - 1. Intermatic, Inc: [www.intermatic.com](http://www.intermatic.com).
  - 2. Tork, a division of NSI Industries LLC: [www.tork.com](http://www.tork.com).
  - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Stem-Mounted Outdoor Photo Controls:
  - 1. Description: Direct-wired photo control unit with threaded conduit mounting stem and field-adjustable swivel base, listed and labeled as complying with UL 773A.
  - 2. Housing: Weatherproof, impact resistant polycarbonate.
  - 3. Photo Sensor: Cadmium sulfide.
  - 4. Provide external sliding shield for field adjustment of light level activation.
  - 5. Light Level Activation: 1 to 5 footcandles turn-on and 3 to 1 turn-off to turn-on ratio with delayed turn-off.
  - 6. Voltage: As required to control the load indicated on the drawings.
  - 7. Failure Mode: Fails to the on position.
  - 8. Load Rating: As required to control the load indicated on the drawings.
  - 9. Provide accessory wall-mounting bracket where indicated or as required to complete installation.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- B. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
- C. Verify that final surface finishes are complete, including painting.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
- E. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
- F. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

### **3.03 INSTALLATION**

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of lighting control devices provided under this section.
  - 1. Mounting Heights: Unless otherwise indicated, as follows:
    - a. Wall Switch Occupancy Sensors: 48 inches above finished floor.
  - 2. Locate wall switch occupancy sensors on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- E. Install lighting control devices plumb and level, and held securely in place.

- F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 2726.
- G. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- H. Identify lighting control devices in accordance with Section 26 0553.
- I. Occupancy Sensor Locations:
  - 1. Location Adjustments: Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage.
  - 2. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.
- J. Outdoor Photo Control Locations:
  - 1. Where possible, locate outdoor photo controls with photo sensor facing north. If north facing photo sensor is not possible, install with photo sensor facing east, west, or down.
  - 2. Locate outdoor photo controls so that photo sensors do not face artificial light sources, including light sources controlled by the photo control itself.
- K. Install outdoor photo controls so that connections are weatherproof. Do not install photo controls with conduit stem facing up in order to prevent infiltration of water into the photo control.
- L. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.
- M. Where indicated, install separate compatible wall switches for manual control interface with lighting control devices or associated power packs.
- N. Unless otherwise indicated, install switches on load side of power packs so that switch does not turn off power pack.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each lighting control device for damage and defects.
- C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area.
- D. Test time switches to verify proper operation.
- E. Test outdoor photo controls to verify proper operation, including time delays where applicable.
- F. Correct wiring deficiencies and replace damaged or defective lighting control devices.

### **3.05 ADJUSTING**

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.
- C. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.
- D. Adjust time switch settings to achieve desired operation schedule as indicated or as directed by Architect. Record settings in written report to be included with submittals.
- E. Adjust external sliding shields on outdoor photo controls under optimum lighting conditions to achieve desired turn-on and turn-off activation as indicated or as directed by Architect.

### **3.06 CLEANING**

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

### **3.07 COMMISSIONING**

- A. See Section 01 9113 for commissioning requirements.

### **3.08 CLOSEOUT ACTIVITIES**

- A. See Section 01 7800 - Closeout Submittals, for closeout submittals.
- B. See Section 01 7900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of lighting control devices to Architect, and correct deficiencies or make adjustments as directed.
- D. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
  - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
  - 2. Location: At project site.

**END OF SECTION**

## **SECTION 26 2416**

### **PANELBOARDS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Lighting and appliance panelboards.
- B. Overcurrent protective devices for panelboards.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- B. Section 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS.
- C. Section 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS: Identification products and requirements.
- D. Section 26 4300 - Surge Protective Devices.

##### **1.03 REFERENCE STANDARDS**

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision E, 2013.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards; National Electrical Contractors Association; 2009.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.
- E. NEMA PB 1 - Panelboards; National Electrical Manufacturers Association; 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; National Electrical Manufacturers Association; 2013 (ANSI/NEMA PB 1.1).
- G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).
- H. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- K. UL 67 - Panelboards; Current Edition, Including All Revisions.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- M. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

##### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
  - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

#### **1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
  1. Include characteristic trip curves for each type and rating of overcurrent protective device.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  1. See Section 01 6000 - Product Requirements, for additional provisions.
  2. Panelboard Keys: Two of each different key.

#### **1.06 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. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Siemens Industry, Inc: [www.usa.siemens.com](http://www.usa.siemens.com).
- B. Eaton Corporation; Cutler-Hammer Products: [www.eaton.com](http://www.eaton.com).
- C. General Electric Company: [www.geindustrial.com](http://www.geindustrial.com).
- D. Schneider Electric; Square D Products: [www.schneider-electric.us](http://www.schneider-electric.us).
- E. Substitutions: See Section 01 6000 - Product Requirements.

#### **2.02 PANELBOARDS - GENERAL REQUIREMENTS**

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
  1. Ambient Temperature:
    - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:

1. Provide panelboards with listed short circuit current rating as indicated on the drawings.
- D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
  1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
  2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
    - a. Indoor Clean, Dry Locations: Type 1.
  2. Boxes: Galvanized steel unless otherwise indicated.
    - a. Provide wiring gutters sized to accommodate the conductors to be installed.
    - b. Provide painted steel boxes for surface-mounted panelboards where indicated, finish to match fronts.
  3. Fronts:
    - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
  4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- K. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 26 4300, list and label panelboards as a complete assembly including surge protective device.

### **2.03 LIGHTING AND APPLIANCE PANELBOARDS**

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
  1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
  2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
  1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
  2. Phase and Neutral Bus Material: Copper.
  3. Ground Bus Material: Copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type.
- E. Enclosures:
  1. Provide surface-mounted enclosures.
  2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
  3. Provide clear plastic circuit directory holder mounted on inside of door.

### **2.04 OVERCURRENT PROTECTIVE DEVICES**

- A. Molded Case Circuit Breakers:



1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
2. Interrupting Capacity:
  - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
    - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
  - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
3. Conductor Terminations:
  - a. Provide mechanical lugs.
  - b. Lug Material: Copper, suitable for terminating copper conductors only.
4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
6. Do not use tandem circuit breakers.
7. Do not use handle ties in lieu of multi-pole circuit breakers.
8. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- B. Verify that mounting surfaces are ready to receive panelboards.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install panelboards securely, in a neat and workmanlike manner in accordance with NECA 1 (general workmanship), NECA 407 (panelboards), and NEMA PB 1.1.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required supports in accordance with Section 26 0529.
- E. Install panelboards plumb.
- F. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Install all field-installed branch devices, components, and accessories.
- I. Provide filler plates to cover unused spaces in panelboards.

### **3.03 FIELD QUALITY CONTROL**

- A. Perform inspection, testing, and adjusting in accordance with Section 01 4000.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers. Tests listed as optional are not required.
- D. Correct deficiencies and replace damaged or defective panelboards or associated components.

### **3.04 ADJUSTING**

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.

- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

### **3.05 CLEANING**

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

**END OF SECTION**

**SECTION 26 2726**  
**WIRING DEVICES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wall switches.
- B. Wall dimmers.
- C. Receptacles.
- D. Wall plates.
- E. Floor box service fittings.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- B. Section 26 0537 - BOXES.
- C. Section 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS: Identification products and requirements.
- D. Section 26 0923 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors, in-wall time switches, and in-wall interval timers.
- E. Section 27 1005 - Structured Telecommunications Cabling and Enclosures: Voice and data jacks.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- B. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2010).
- C. NEMA WD 6 - Wiring Device -- Dimensional Specifications; National Electrical Manufacturers Association; 2002 (R2008).
- D. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- F. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- G. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- H. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.
- I. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
  - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
  - 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
  - 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
  - 5. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

### **1.05 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: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Operation and Maintenance Data:
  - 1. GFI Receptacles: Include information on status indicators and testing procedures and intervals.
- E. Project Record Documents: Record actual installed locations of wiring devices.

### **1.06 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

### **1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Hubbell Incorporated: [www.hubbell-wiring.com](http://www.hubbell-wiring.com).
- B. Leviton Manufacturing Company, Inc: [www.leviton.com](http://www.leviton.com).
- C. Lutron Electronics Company, Inc: [www.lutron.com](http://www.lutron.com).
- D. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us](http://www.legrand.us)
- E. Substitutions: See Section 01 6000 - Product Requirements.
- F. Source Limitations: Where possible, for each type of wiring device furnish products produced by a single manufacturer and obtained from a single supplier.

### **2.02 WIRING DEVICE APPLICATIONS**

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. Provide weather resistant GFI receptacles with specified weatherproof covers for all receptacles installed outdoors or in damp or wet locations.
- C. Provide GFI protection for all receptacles installed within 6 feet of sinks.
- D. Provide GFI protection for all receptacles installed in kitchens.
- E. Provide GFI protection for all receptacles serving electric drinking fountains.

### **2.03 WIRING DEVICE FINISHES:**

- A. Wiring device and cover finishes will be selected during the submittal phase except as noted below.
- B. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.
- C. Access Floor Boxes: Gray wiring devices with gray brass cover with insert to match floor covering.

### **2.04 WALL SWITCHES**

- A. Manufacturers:
  - 1. Hubbell Incorporated: [www.hubbell-wiring.com](http://www.hubbell-wiring.com).
  - 2. Leviton Manufacturing Company, Inc: [www.leviton.com](http://www.leviton.com).
  - 3. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us](http://www.legrand.us)
  - 4. Substitutions: See Section 01 6000 - Product Requirements.

- B. All Wall Switches: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw or three way as indicated on the drawings.

## **2.05 WALL DIMMERS**

- A. All Wall Dimmers: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.
- B. Control: Slide control type with separate on/off switch.
- C. Power Rating, Unless Otherwise Indicated or Required to Control the Load Indicated on the Drawings:

## **2.06 RECEPTACLES**

- A. Manufacturers:
  - 1. Leviton Manufacturing Company, Inc: [www.leviton.com](http://www.leviton.com).
  - 2. Lutron Electronics Company, Inc; Designer Style: [www.lutron.com](http://www.lutron.com).
  - 3. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us](http://www.legrand.us)
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. All Receptacles: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring with separate ground terminal screw.
  - 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
  - 1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
- D. GFI Receptacles:
  - 1. All GFI Receptacles: Provide with feed-through protection, light to indicate ground fault tripped condition and loss of protection, and list as complying with UL 943, class A.
    - a. Provide test and reset buttons of same color as device.
  - 2. Standard GFI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
  - 3. Weather Resistant GFI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

## **2.07 WALL PLATES**

- A. Manufacturers:
  - 1. Leviton Manufacturing Company, Inc: [www.leviton.com](http://www.leviton.com).
  - 2. Lutron Electronics Company, Inc: [www.lutron.com](http://www.lutron.com).
  - 3. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us](http://www.legrand.us)
- B. All Wall Plates: Comply with UL 514D.
  - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
  - 2. Size: Standard.
  - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

- D. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.
- E. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.

## **2.08 FLOOR BOX SERVICE FITTINGS**

- A. Manufacturers:
  - 1. Hubbell Incorporated: [www.hubbell-wiring.com](http://www.hubbell-wiring.com).
  - 2. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
  - 3. Wiremold, a brand of Legrand North America, Inc: [www.legrand.us](http://www.legrand.us)
- B. Description: Service fittings compatible with floor boxes provided under Section 26 0537 with all components, adapters, and trims required for complete installation.
- C. Flush Floor Service Fittings:
  - 1. Single Service Flush Convenience Receptacles:
    - a. Cover: Round.
    - b. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that floor boxes are adjusted properly.
- F. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- G. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

### **3.03 INSTALLATION**

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of wiring devices provided under this section.
  - 1. Mounting Heights: Unless otherwise indicated, as follows:
    - a. Wall Switches: 48 inches above finished floor.
    - b. Receptacles: 18 inches above finished floor or 6 inches above counter.
  - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
  - 3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
  - 4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
  - 5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.

- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFI receptacles with integral GFI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.
- K. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- L. Do not share neutral conductor on branch circuits utilizing wall dimmers.
- M. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- N. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- O. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- P. Identify wiring devices in accordance with Section 26 0553.

#### **3.04 FIELD QUALITY CONTROL**

- A. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch and wall dimmer with circuit energized to verify proper operation.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Correct wiring deficiencies and replace damaged or defective wiring devices.

#### **3.05 ADJUSTING**

- A. Adjust devices and wall plates to be flush and level.

#### **3.06 CLEANING**

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

**END OF SECTION**

## **SECTION 26 2813**

### **FUSES**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Fuses.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS: Identification products and requirements.
- B. Section 26 2818 - ENCLOSED SWITCHES: Fusible switches.
- C. Section 26 2913 - ENCLOSED CONTROLLERS: Fusible switches.

##### **1.03 REFERENCE STANDARDS**

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; 2012.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.
- D. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses; Current Edition, Including All Revisions.

##### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
    - a. Fusible Enclosed Switches: See Section 26 2818.
    - b. Fusible Switches for Enclosed Motor Controllers: See Section 26 2913.
  - 2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
  - 3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

##### **1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.

##### **1.06 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.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Cooper Bussmann, a division of Cooper Industries: [www.cooperindustries.com](http://www.cooperindustries.com).
- B. Mersen (formerly Ferraz Shawmut): [ferrazshawmut.mersen.com](http://ferrazshawmut.mersen.com).
- C. Littelfuse, Inc: [www.littelfuse.com](http://www.littelfuse.com).
- D. Substitutions: See Section 01 6000 - Product Requirements.



## **2.02 APPLICATIONS**

- A. Feeders:
  - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
- B. Individual Motor Branch Circuits: Class RK1, time-delay.

## **2.03 FUSES**

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C. Provide fuses of the same type, rating, and manufacturer within the same switch.
- D. Comply with UL 248-1.
- E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.
- F. Voltage Rating: Suitable for circuit voltage.
- G. Class R Fuses: Comply with UL 248-12.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.
- B. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Do not install fuses until circuits are ready to be energized.
- B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

**END OF SECTION**

**SECTION 26 2818**  
**ENCLOSED SWITCHES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Enclosed safety switches.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- B. Section 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS.
- C. Section 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS: Identification products and requirements.
- D. Section 26 2813 - FUSES.
- E. Section 26 2913 - ENCLOSED CONTROLLERS: Manual motor controllers.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); National Electrical Manufacturers Association; 2013.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).
- E. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- G. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
  - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
  - 4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

**1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- C. Project Record Documents: Record actual locations of enclosed switches.
- D. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 6000 - Product Requirements, for additional provisions.

## **1.06 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.

## **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

## **1.08 FIELD CONDITIONS**

- A. Maintain ambient temperature between -22 degrees F and 104 degrees F during and after installation of enclosed switches.

# **PART 2 PRODUCTS**

## **2.01 MANUFACTURERS**

- A. Eaton Corporation; Cutler-Hammer Products: [www.eaton.com](http://www.eaton.com).
- B. General Electric Company: [www.geindustrial.com](http://www.geindustrial.com).
- C. Schneider Electric; Square D Products: [www.schneider-electric.us](http://www.schneider-electric.us).
- D. Substitutions: See Section 01 6000 - Product Requirements.
- E. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

## **2.02 ENCLOSED SAFETY SWITCHES**

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
  - 1. Altitude: Less than 6,600 feet.
  - 2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
  - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
  - 2. Minimum Ratings:
    - a. Heavy Duty Single Throw Switches Protected by Class R, Class J, Class L, or Class T Fuses: 200,000 rms symmetrical amperes.
- G. Provide with switch blade contact position that is visible when the cover is open.
- H. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
  - 1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.
- I. Conductor Terminations: Suitable for use with the conductors to be installed.
- J. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.

- K. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- L. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
    - a. Indoor Clean, Dry Locations: Type 1.
    - b. Outdoor Locations: Type 3R.
  - 2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.
- M. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- N. Heavy Duty Switches:
  - 1. Comply with NEMA KS 1.
  - 2. Conductor Terminations:
    - a. Provide mechanical lugs unless otherwise indicated.
    - b. Lug Material: Copper, suitable for terminating copper conductors only.
  - 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed safety switches.
- D. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install enclosed switches in accordance with manufacturer's instructions.
- B. Install enclosed switches securely, in a neat and workmanlike manner in accordance with NECA 1.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required supports in accordance with Section 26 0529.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Provide fuses complying with Section 26 2813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.
- I. Identify enclosed switches in accordance with Section 26 0553.

### **3.03 FIELD QUALITY CONTROL**

- A. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.
- D. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

### **3.04 ADJUSTING**

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

### **3.05 CLEANING**

- A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

**END OF SECTION**

**SECTION 26 2913**  
**ENCLOSED CONTROLLERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Manual motor controllers.
- B. Combination magnetic motor controllers and disconnects.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS.
- B. Section 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS: Identification products and requirements.
- C. Section 26 2813 - FUSES.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- B. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC; National Electrical Manufacturers Association; 2000 (R2008).
- C. NEMA ICS 6 - Industrial Control and Systems: Enclosures; National Electrical Manufacturers Association; 1993 (R2006).
- D. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); National Electrical Manufacturers Association; 2013.
- E. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Maintenance Data: Replacement parts list for controllers.

**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, classified, and labeled as suitable for the purpose intended.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Eaton Corporation; Cutler-Hammer Product: [www.eaton.com](http://www.eaton.com).
- B. General Electric Company: [www.geindustrial.com](http://www.geindustrial.com).

- C. Schneider Electric; Square D Products: [www.schneider-electric.us](http://www.schneider-electric.us).
- D. Substitutions: See Section 01 6000 - Product Requirements.

## **2.02 MANUAL CONTROLLERS**

- A. Manual Motor Controllers: NEMA ICS 2, AC general-purpose, Class A, manually operated, full-voltage controller with overload element, red pilot light, NO auxiliary contact, and toggle operator.
- B. Fractional Horsepower Manual Controllers: NEMA ICS 2, AC general-purpose, Class A, manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, red pilot light, and toggle operator.
- C. Enclosures: NEMA ICS 6, Type 1.

## **2.03 DISCONNECTS**

- A. Combination Controllers: Combine motor controllers with disconnects in common enclosure. Obtain IEC Class 2 coordinated component protection.
- B. Fusible Switch Assemblies: NEMA KS 1, enclosed knife switch with externally operable handle. Fuse clips: Designed to accommodate Class R fuses.

# **PART 3 EXECUTION**

## **3.01 INSTALLATION**

- A. Install enclosed controllers where indicated, in accordance with manufacturer's instructions.
- B. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
- C. Provide supports in accordance with Section 26 0529.
- D. Provide fuses for fusible switches; refer to Section 26 2813 for product requirements.
- E. Select and install overload heater elements in motor controllers to match installed motor characteristics.
- F. Identify enclosed controllers in accordance with Section 26 0553.

## **3.02 FIELD QUALITY CONTROL**

- A. Perform field inspection and testing in accordance with Section 01 4000.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.16.1.

**END OF SECTION**

**SECTION 26 4300**  
**SURGE PROTECTIVE DEVICES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surge protective devices for service entrance locations.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 0526 - Grounding and Bonding.
- B. Section 26 2416 - Panelboards.
- C. Section 26 2726 - Wiring Devices: Receptacles with integral surge protection.
- D. Section 27 1005 - Structured Cabling for Voice and Data: Protectors for communications service entrance.

**1.03 ABBREVIATIONS AND ACRONYMS**

- A. EMI/RFI: Electromagnetic Interference/Radio Frequency Interference.
- B. SPD: Surge Protective Device.

**1.04 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2008.
- C. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 1283 - Standard for Electromagnetic Interference Filters; Current Edition, Including All Revisions.
- F. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

**1.05 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination: Coordinate size and location of overcurrent device compatible with the actual surge protective device and location to be installed. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to ordering equipment.

**1.06 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.
- C. Certificates: Manufacturer's documentation of listing for compliance with the following standards:
  - 1. UL 1449.
- D. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data: Include information on status indicators and recommended maintenance procedures and intervals.

**1.07 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.



## **1.08 DELIVERY, STORAGE, AND PROTECTION**

- A. Store in a clean, dry space in accordance with manufacturer's written instructions.

## **1.09 FIELD CONDITIONS**

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

## **1.10 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer's Warranty: Provide minimum five year warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.

# **PART 2 PRODUCTS**

## **2.01 MANUFACTURERS**

- A. Basis of Design: Schneider Electric; Square D Brand SurgeLogic Products as indicated under product article(s) below; [www.surgeologic.com](http://www.surgeologic.com).
- B. Field-installed, Externally Mounted Surge Protective Devices - Other Acceptable Manufacturers:
  - 1. Schneider Electric; Square D Brand SurgeLogic Products; EMA Series: [www.surgeologic.com](http://www.surgeologic.com).
- C. Substitutions: See Section 01 6000 - Product Requirements.
- D. Source Limitations: Furnish surge protective devices produced by a single manufacturer and obtained from a single supplier.

## **2.02 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS**

- A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.
- B. Protected Modes:
  - 1. Wye Systems: L-N, L-G, N-G, L-L.
- C. UL 1449 Voltage Protection Ratings (VPRs):
  - 1. 208Y/120V System Voltage: Not more than 1,000 V for L-N, L-G, and N-G modes and 1,200 V for L-L mode.
- D. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.
- E. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
  - 1. Indoor clean, dry locations: Type 1.
- F. Mounting for Field-installed, Externally Mounted SPDs: Unless otherwise indicated, as specified for the following locations:
  - 1. Provide surface-mounted SPD where mounted in non-public areas or adjacent to surface-mounted equipment.
- G. Equipment Containing Factory-installed, Internally Mounted SPDs: Listed and labeled as a complete assembly including SPD.
  - 1. Panelboards: See Section 26 2416.

## **2.03 SURGE PROTECTIVE DEVICES FOR SERVICE ENTRANCE LOCATIONS**

- A. Unless otherwise indicated, provide field-installed, externally mounted or factory-installed, internally mounted SPDs.
- B. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.

- C. Provide SPDs utilizing only field-replaceable modular protection circuits.
- D. Surge Current Rating: Not less than 120 kA per mode/240 kA per phase.
- E. Repetitive Surge Current Capacity: Not less than 5,000 impulses.
- F. UL 1449 Nominal Discharge Current (I-n): 20 kA.
- G. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
- H. EMI/RFI Filtering: Provide EMI/RFI filter to attenuate electrical noise; listed as complying with UL 1283 for Type 2 SPDs (UL 1283 listing not available for Type 1 SPDs).
- I. Diagnostics:
  - 1. Protection Status Monitoring: Provide indicator lights to report the protection for each phase.
  - 2. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
  - 3. Surge Counter: Provide surge event counter with manual reset button, surge count retention upon power loss, and six digit LCD display that indicates quantity of surge events.
- J. Basis of Design: Schneider Electric; Square D Brand SurgeLogic Products; [www.surgeLogic.com](http://www.surgeLogic.com).
  - 1. Field-installed, Externally Mounted Surge Protective Devices:
    - a. EMA Series: Replaceable modules; 200 kA SCCR; individually fused MOVs, thermal fusing; dry contacts; EMI/RFI filtering; surge counter; duty cycle tested for 20,000 impulses; 10 year warranty.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.
- C. Verify that electrical equipment is ready to accept connection of the SPD and that installed overcurrent device is consistent with requirements of the drawings and manufacturer's instructions.
- D. Verify system grounding and bonding is in accordance with Section 26 0526, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1.
- B. Install SPD in accordance with manufacturer's instructions.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Unless indicated otherwise, connect service entrance surge protective device on load side of service disconnect main overcurrent device.
- E. Provide conductors with minimum ampacity as indicated on the drawings, as required by NFPA 70, and not less than manufacturer's recommended minimum conductor size.
- F. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.

- G. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 0526 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

### **3.03 FIELD QUALITY CONTROL**

- A. Perform inspection, testing, and adjusting in accordance with Section 01 4000.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS Section 7.19.1.

### **3.04 CLEANING**

- A. Repair scratched or marred exterior surfaces to match original factory finish.

**END OF SECTION**

**SECTION 26 5100**  
**INTERIOR LIGHTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Interior luminaires.
- B. Exit signs.
- C. Luminaire accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 0537 - BOXES.
- B. Section 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS: Identification products and requirements.
- C. Section 26 0923 - LIGHTING CONTROL DEVICES: Automatic controls for lighting including occupancy sensors, outdoor motion sensors, time switches, outdoor photo controls, and daylighting controls.
- D. Section 26 2726 - WIRING DEVICES: Manual wall switches and wall dimmers.
- E. Section 26 5600 - EXTERIOR LIGHTING.

**1.03 REFERENCE STANDARDS**

- A. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; Illuminating Engineering Society; 2008.
- B. IES LM-80 - Approved Method: Measuring Lumen Maintenance of LED Light Sources; Illuminating Engineering Society; 2008.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- D. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association; 2006.
- E. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; National Electrical Contractors Association; 2006.
- F. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; National Electrical Manufacturers Association; 2012.
- G. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. NFPA 101 - Life Safety Code; National Fire Protection Association; 2012.
- I. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- J. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
  - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
  - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.

4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

#### **1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
  1. LED Luminaires:
    - a. Include estimated useful life, calculated based on IES LM-80 test data.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

#### **1.06 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.

#### **1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

#### **1.08 FIELD CONDITIONS**

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

#### **1.09 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide three year manufacturer warranty for all LED luminaires, including drivers.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS - LUMINAIRES**

- A. Acuity Brands, Inc: [www.acuitybrands.com](http://www.acuitybrands.com).
- B. Cooper Lighting, a division of Cooper Industries: [www.cooperindustries.com](http://www.cooperindustries.com).
- C. Hubbell Lighting, Inc: [www.hubbelllighting.com](http://www.hubbelllighting.com).
- D. Substitutions: See Section 01 6000 - Product Requirements, except where individual luminaire types are designated with substitutions not permitted.

#### **2.02 LUMINAIRE TYPES**

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Substitutions: See Section 01 6000 - Product Requirements, except where individual luminaire types are designated with substitutions not permitted.

#### **2.03 LUMINAIRES**

- A. Manufacturers:
  1. Acuity Brands, Inc: [www.acuitybrands.com](http://www.acuitybrands.com).
  2. Cooper Lighting, a division of Cooper Industries: [www.cooperindustries.com](http://www.cooperindustries.com).
  3. Hubbell Lighting, Inc: [www.hubbelllighting.com](http://www.hubbelllighting.com).
  4. Substitutions: See Section 01 6000 - Product Requirements.

- B. Provide products that comply with requirements of NFPA 70.
- C. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- H. Recessed Luminaires:
  - 1. Ceiling Compatibility: Comply with NEMA LE 4.
- I. LED Luminaires:
  - 1. Components: UL 8750 recognized or listed as applicable.
  - 2. Tested in accordance with IES LM-79 and IES LM-80.
  - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

## **2.04 EXIT SIGNS**

- A. Manufacturers - Powered and Self-Luminous Signs:
  - 1. Acuity Brands, Inc: [www.acuitybrands.com](http://www.acuitybrands.com).
  - 2. Cooper Lighting, a division of Cooper Industries: [www.cooperindustries.com](http://www.cooperindustries.com).
  - 3. Hubbell Lighting, Inc: [www.hubbelllighting.com](http://www.hubbelllighting.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. All Exit Signs: Internally illuminated with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
  - 1. Number of Faces: Single or double as indicated or as required for the installed location.
  - 2. Directional Arrows: As indicated or as required for the installed location.
- C. Self-Powered Exit Signs:
  - 1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
  - 2. Battery: Sealed maintenance-free nickel cadmium unless otherwise indicated.
  - 3. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
  - 4. Provide low-voltage disconnect to prevent battery damage from deep discharge.
  - 5. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101; provide indicator light(s) to report test and diagnostic status.

## **2.05 ACCESSORIES**

- A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.

- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

### **3.03 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of luminaires provided under this section.
- B. Install products according to manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship).
- D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- E. Suspended Ceiling Mounted Luminaires:
  - 1. Do not use ceiling tiles to bear weight of luminaires.
  - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
  - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
  - 4. Secure pendant-mounted luminaires to building structure.
  - 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
  - 6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
  - 7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- F. Recessed Luminaires:
  - 1. Install trims tight to mounting surface with no visible light leakage.
- G. Suspended Luminaires:
  - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
  - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
  - 3. Install canopies tight to mounting surface.
  - 4. Unless otherwise indicated, support pendants from swivel hangers.
- H. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- I. Install accessories furnished with each luminaire.
- J. Bond products and metal accessories to branch circuit equipment grounding conductor.
- K. Exit Signs:
  - 1. Unless otherwise indicated, connect unit to unswitched power from circuit indicated. Bypass local switches, contactors, or other lighting controls.
- L. Install lamps in each luminaire.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Test self-powered exit signs to verify proper operation upon loss of normal power supply.

- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

### **3.05 ADJUSTING**

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.
- B. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

### **3.06 CLEANING**

- A. Clean surfaces according to NECA 500 (commercial lighting) and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

### **3.07 CLOSEOUT ACTIVITIES**

- A. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

### **3.08 PROTECTION**

- A. Protect installed luminaires from subsequent construction operations.

**END OF SECTION**



**SECTION 26 5600**  
**EXTERIOR LIGHTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Exterior luminaires.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- B. Section 26 0537 - Boxes.
- C. Section 26 0919 - Enclosed Contactors: Lighting contactors.
- D. Section 26 0923 - Lighting Control Devices: Automatic controls for lighting including time switches and outdoor photo controls.
- E. Section 26 2726 - Wiring Devices: Receptacles for installation in poles.
- F. Section 26 5100 - INTERIOR LIGHTING.

**1.03 REFERENCE STANDARDS**

- A. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; Illuminating Engineering Society; 2008.
- B. IES LM-80 - Approved Method: Measuring Lumen Maintenance of LED Light Sources; Illuminating Engineering Society; 2008.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- D. NECA/IESNA 501 - Recommended Practice for Installing Exterior Lighting Systems; 2006.
- E. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- G. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

**1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
  - 1. LED Luminaires:
    - a. Include estimated useful life, calculated based on IES LM-80 test data.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

### **1.06 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.

### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

### **1.08 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide three year manufacturer warranty for all LED luminaires, including drivers.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Acuity Brands, Inc: [www.acuitybrands.com](http://www.acuitybrands.com).
- B. Cooper Lighting, a division of Cooper Industries: [www.cooperindustries.com](http://www.cooperindustries.com).
- C. Hubbell Lighting, Inc: [www.hubbellighting.com](http://www.hubbellighting.com).

### **2.02 LUMINAIRE TYPES**

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Substitutions: See Section 01 6000 - Product Requirements.

### **2.03 LUMINAIRES**

- A. Manufacturers:
  - 1. Acuity Brands, Inc: [www.acuitybrands.com](http://www.acuitybrands.com).
  - 2. Cooper Lighting, a division of Cooper Industries: [www.cooperindustries.com](http://www.cooperindustries.com).
  - 3. Hubbell Lighting, Inc: [www.hubbellighting.com](http://www.hubbellighting.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Provide products that comply with requirements of NFPA 70.
- C. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- D. Provide products listed, classified, and labeled as suitable for the purpose intended.
- E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- H. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.
- I. LED Luminaires:
  - 1. Components: UL 8750 recognized or listed as applicable.
  - 2. Tested in accordance with IES LM-79 and IES LM-80.
  - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as shown on the drawings.

- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

### **3.03 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of luminaires provided under this section.
- B. Install products according to manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship) and NECA/IESNA 501 (exterior lighting).
- D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- E. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- F. Install accessories furnished with each luminaire.
- G. Bond products and metal accessories to branch circuit equipment grounding conductor.
- H. Install lamps in each luminaire.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

### **3.05 CLEANING**

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

### **3.06 CLOSEOUT ACTIVITIES**

- A. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

### **3.07 PROTECTION**

- A. Protect installed luminaires from subsequent construction operations.

**END OF SECTION**

## **SECTION 27 1005**

### **STRUCTURED CABLING FOR VOICE AND DATA - INSIDE-PLANT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Communications system design requirements.
- B. Communications pathways.
- C. Copper cable and terminations.
- D. Communications equipment room fittings.
- E. Communications outlets.
- F. Communications grounding and bonding.
- G. Communications identification.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
  - 1. Includes bonding jumpers for bonding of communications systems and electrical system grounding.
- C. Section 26 0534 - CONDUIT.
- D. Section 26 0537 - BOXES.
- E. Section 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS: Identification products.
- F. Section 26 2726 - Wiring Devices.
- G. Section 33 7119 - Electrical Underground Ducts and Manholes.

##### **1.03 REFERENCE STANDARDS**

- A. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment; Electronic Industries Alliance/Electrical Components Association; Revision E, 2005.
- B. NECA/BICSI 568 - Standard for Installing Building Telecommunications Cabling; National Electrical Contractors Association; 2006. (ANSI/NECA/BICSI 568)
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. TIA-568-C.1 - Commercial Building Telecommunications Cabling Standard; Telecommunications Industry Association; Rev C, 2009 (with Addenda; 2012).
- E. TIA-568-C.2 - Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components; Telecommunications Industry Association; Rev C, 2009.
- F. TIA-569-C - Telecommunications Pathways and Spaces; Telecommunications Industry Association; Rev C, 2012 (with Addenda; 2013).
- G. TIA-606-B - Administration Standard for the Telecommunications Infrastructure; Telecommunications Industry Association; Rev B, 2012.
- H. TIA-607-B - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; Telecommunications Industry Association; Rev B, 2012 (with Addenda; 2013).
- I. UL 444 - Communications Cables; Current Edition, Including All Revisions.
- J. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

##### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider.

2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
  3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  4. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Communications Service Provider representative.

#### **1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep stored products clean and dry.

#### **1.08 WARRANTY**

- A. Correct defective Work within a 2 year period after Date of Substantial Completion.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Cabling and Equipment:
  1. 3M Communications Technologies: [solutions.3m.com](http://solutions.3m.com).
  2. Siemon Company: [www.siemon.com](http://www.siemon.com).
  3. TE Connectivity: [www.te.com](http://www.te.com).

#### **2.02 SYSTEM DESIGN**

- A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
  1. Comply with TIA-568 (cabling) and TIA-569 (pathways), latest editions (commercial standards).
  2. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
  3. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.
- B. System Description:
  1. Building Entrance Cable: By others.
  2. Offices and Work Areas: Provide one voice outlet and one data outlet in each work area.
- C. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
  1. Capacity: As required to terminate all cables required by design criteria plus minimum 25 percent spare space.
- D. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

#### **2.03 PATHWAYS**

- A. Conduit: As specified in Section 26 0534; provide pull cords in all conduit.

- B. Underground Service Entrance: Rigid polyvinyl chloride (PVC) conduit, Schedule 40.

## **2.04 COPPER CABLE AND TERMINATIONS**

- A. Copper Horizontal Cable:
  - 1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568 and listed and labeled as complying with UL 444.
  - 2. Cable Type - Data: TIA-568 Category 6 UTP (unshielded twisted pair); 23 AWG.
  - 3. Cable Type - Voice: TIA-568 Category 3 UTP (unshielded twisted pair); 24 AWG.
  - 4. Cable Capacity: 4-pair.
  - 5. Cable Applications:
    - a. General Purpose Applications: Use listed NFPA 70 Type CM/CMG general purpose cable, Type CMR riser cable, or Type CMP plenum cable.
  - 6. Cable Jacket Color -Data Cable: Blue.
  - 7. Cable Jacket Color - Voice Cable: Gray.
- B. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.
- C. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
  - 1. Performance: 500 mating cycles.
  - 2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.

## **2.05 COMMUNICATIONS EQUIPMENT ROOM FITTINGS**

- A. Copper Cross-Connection Equipment:
  - 1. Connector Blocks for Category 3 Cabling: Type 66 insulation displacement connectors; capacity sufficient for cables to be terminated plus 25 percent spare.
  - 2. Connector Blocks for Category 5e and Up Cabling: Type 110 insulation displacement connectors; capacity sufficient for cables to be terminated plus 25 percent spare.
  - 3. Patch Panels for Copper Cabling: Sized to fit EIA/ECA-310 standard 19 inch wide equipment racks; 0.09 inch thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
    - a. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
    - b. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
    - c. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
    - d. Provide incoming cable strain relief and routing guides on back of panel.
- B. Equipment Racks and Cabinets: EIA/ECA-310 standard 19 inch wide component racks.
  - 1. Wall Mounted Racks: Steel construction, hinged to allow access to back of installed components.

## **2.06 COMMUNICATIONS OUTLETS**

- A. Outlet Boxes: Comply with Section 26 0537.
  - 1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
  - 2. Minimum Size, Unless Otherwise Indicated:
    - a. Voice Only Outlets: 4 inch by 2 inch by 2-1/8 inch deep (100 by 50 by 54 mm) trade size.
    - b. Data or Combination Voice/Data Outlets: 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.
- B. Wall Plates:
  - 1. Comply with system design standards and UL 514C.
  - 2. Accepts modular jacks/inserts.

3. Capacity:
  - a. Voice Only Outlets: 1 ports.
  - b. Data or Combination Voice/Data Outlets: 2 ports.
4. Wall Plate Material/Finish - Flush-Mounted Outlets: Match wiring device and wall plate finishes specified in Section 26 2726.

## **2.07 GROUNDING AND BONDING COMPONENTS**

- A. Comply with TIA-607.
- B. Comply with Section 26 0526.

## **2.08 IDENTIFICATION PRODUCTS**

- A. Comply with TIA-606.
- B. Comply with Section 26 0553.

## **2.09 SOURCE QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Factory test cables according to TIA-568.

# **PART 3 EXECUTION**

## **3.01 INSTALLATION - GENERAL**

- A. Comply with latest editions and addenda of TIA-568 (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), NECA/BICSI 568, NFPA 70, and SYSTEM DESIGN as specified in PART 2.
- B. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

## **3.02 INSTALLATION OF PATHWAYS**

- A. Install pathways with the following minimum clearances:
  1. 48 inches from motors, transformers, and uninterruptible power systems.
  2. 12 inches from power conduits and cables and panelboards.
  3. 5 inches from fluorescent and high frequency lighting fixtures.
  4. 6 inches from flues, hot water pipes, and steam pipes.
- B. Conduit, in Addition to Requirements of Section 26 0534:
  1. Arrange conduit to provide no more than the equivalent of two 90 degree bend(s) between pull points.
  2. Conduit Bends: Inside radius not less than 10 times conduit internal diameter.
  3. Arrange conduit to provide no more than 100 feet between pull points.
  4. Minimum Cover - Underground Service Entrance: Comply with NFPA 70 and Communications Service Provider requirements.
- C. Outlet Boxes:
  1. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of telecommunications outlets provided under this section.
    - a. Mounting Heights: Unless otherwise indicated, as follows:
      - 1) Telephone and Data Outlets: 18 inches above finished floor.
      - 2) Telephone Outlets for Side-Reach Wall-Mounted Telephones: 54 inches above finished floor to top of telephone.
    - b. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
    - c. Provide minimum of 24 inches horizontal separation between flush mounted outlet boxes installed on opposite sides of fire rated walls.
    - d. Unless otherwise indicated, provide separate outlet boxes for line voltage and low voltage devices.
    - e. Locate outlet boxes so that wall plate does not span different building finishes.
    - f. Locate outlet boxes so that wall plate does not cross masonry joints.

### **3.03 INSTALLATION OF EQUIPMENT AND CABLING**

- A. Cabling:
  - 1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
  - 2. Do not over-cinch or crush cables.
  - 3. Do not exceed manufacturer's recommended cable pull tension.
  - 4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.
- B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
  - 1. At Distribution Frames: 120 inches.
  - 2. At Outlets - Copper: 12 inches.
- C. Copper Cabling:
  - 1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch from point of termination.
  - 2. For 4-pair cables in conduit, do not exceed 25 pounds pull tension.
  - 3. Use T568B wiring configuration.
- D. Wall-Mounted Racks and Enclosures:
  - 1. Install to plywood backboards only, unless otherwise indicated.
  - 2. Mount so height of topmost panel does not exceed 60 inches above floor.
- E. Identification:
  - 1. Use wire and cable markers to identify cables at each end.
  - 2. Use manufacturer-furnished label inserts, identification labels, or engraved wallplate to identify each jack at communications outlets with unique identifier.
  - 3. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Comply with inspection and testing requirements of specified installation standards.
- C. Visual Inspection:
  - 1. Inspect cable jackets for certification markings.
  - 2. Inspect cable terminations for color coded labels of proper type.
  - 3. Inspect outlet plates and patch panels for complete labels.
- D. Testing - Copper Cabling and Associated Equipment:
  - 1. Test operation of shorting bars in connection blocks.
  - 2. Category 3 Links: Test each pair for short circuit continuity, short to ground, crosses, reversed polarity, operational and ring-back, and dial tone.
  - 3. Category 5e and Above Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay.
- E. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

**END OF SECTION**



**SECTION 28 3100**  
**FIRE DETECTION AND ALARM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fire alarm system design and installation, including all components, wiring, and conduit.
- B. Transmitters for communication with supervising station.
- C. Circuits from protected premises to supervising station, including conduit.
- D. Maintenance of fire alarm system under contract for specified warranty period.

**1.02 RELATED REQUIREMENTS**

**1.03 REFERENCE STANDARDS**

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits; 2002 (Cor 1, 2012).
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 72 - National Fire Alarm and Signaling Code; 2013.
- F. NFPA 101 - Life Safety Code; 2012.

**1.04 SUBMITTALS**

- A. Evidence of designer qualifications.
- B. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
  - 1. Copy (if any) of list of data required by authority having jurisdiction.
  - 2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
  - 3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
  - 4. System zone boundaries and interfaces to fire safety systems.
  - 5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
  - 6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
  - 7. List of all devices on each signaling line circuit, with spare capacity indicated.
  - 8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
  - 9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
  - 10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
  - 11. Certification by the manufacturer of the control unit that the system design complies with the contract documents.
  - 12. Certification by Contractor that the system design complies with the contract documents.
- C. Evidence of installer qualifications.
- D. Evidence of maintenance contractor qualifications, if different from installer.
- E. Inspection and Test Reports:
  - 1. Submit inspection and test plan prior to closeout demonstration.

2. Submit documentation of satisfactory inspections and tests.
  3. Submit NFPA 72 "Inspection and Test Form," filled out.
- F. Operating and Maintenance Data: Revise and resubmit until acceptable; have one set available during closeout demonstration:
1. Complete set of specified design documents, as approved by authority having jurisdiction.
  2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
  3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
  4. List of recommended spare parts, tools, and instruments for testing.
  5. Replacement parts list with current prices, and source of supply.
  6. Detailed troubleshooting guide and large scale input/output matrix.
  7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
  8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
- G. Project Record Documents: Have one set available during closeout demonstration:
1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
  2. "As installed" wiring and schematic diagrams, with final terminal identifications.
  3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.
- H. Closeout Documents:
1. Certification by manufacturer that the system has been installed in compliance with his installation requirements, is complete, and is in satisfactory operating condition.
  2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.
  3. Certificate of Occupancy.
  4. Maintenance contract.
- I. Maintenance Materials, Tools, and Software: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
  2. Furnish spare parts of same manufacturer and model as those installed; deliver in original packaging, labeled in same manner as in operating and maintenance data and place in spare parts cabinet.

## **1.05 QUALITY ASSURANCE**

- A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.
- B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
  2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
  3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.
  4. Contract maintenance office located within 50 miles of project site.
  5. Certified in the State in which the Project is located as fire alarm installer.

- C. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.
- D. Instructor Qualifications: Experienced in technical instruction, understanding fire alarm theory, and able to provide the required training; trained by fire alarm control unit manufacturer.

#### **1.06 WARRANTY**

- A. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.
- B. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Fire Alarm Control Units: Provided their products meet or exceed the performance of the basis of design product, products of the following are acceptable:
  - 1. Honeywell Security & Fire Solutions/Gamewell-FCI: [www.gamewell-fci.com](http://www.gamewell-fci.com).
  - 2. Honeywell Security & Fire Solutions/Notifier: [www.notifier.com](http://www.notifier.com).
  - 3. Provide all control units made by the same manufacturer.
- B. Initiating Devices, and Notification Appliances:
  - 1. Honeywell Security & Fire Solutions/Gamewell-FCI: [www.gamewell-fci.com](http://www.gamewell-fci.com).
  - 2. Honeywell Security & Fire Solutions/Notifier: [www.notifier.com](http://www.notifier.com).
  - 3. Same manufacturer as control units.
  - 4. Provide all initiating devices and notification appliances made by the same manufacturer.
- C. Substitutions: See Section 01 6000 - Product Requirements.
  - 1. For other acceptable manufacturers of control units specified, submit product data showing equivalent features and compliance with contract documents.
  - 2. For substitution of products by manufacturers not listed, submit product data showing features and certification by Contractor that the design will comply with contract documents.

#### **2.02 FIRE ALARM SYSTEM**

- A. Fire Alarm System: Provide a new automatic fire detection and alarm system:
  - 1. Provide all components necessary, regardless of whether shown in the contract documents or not.
  - 2. Protected Premises: Entire building shown on drawings.
  - 3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
    - a. ADA Standards.
    - b. The requirements of the State Fire Marshal.
    - c. The requirements of the local authority having jurisdiction .
    - d. Applicable local codes.
    - e. The contract documents (drawings and specifications).
    - f. NFPA 101.
    - g. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
  - 4. Hearing Impaired Occupants: Provide visible notification devices in all public areas and in dwelling units.
  - 5. Fire Command Center: Location indicated on drawings.
  - 6. Master Control Unit (Panel): New, located at fire command center.
- B. Supervising Stations and Fire Department Connections:
  - 1. Public Fire Department Notification: By on-premises supervising station.
  - 2. On-Premises Supervising Station: Existing proprietary station operated by Owner, located at \_\_\_\_\_

3. Remote Supervising Station: UL-listed central station under contract to facility.
  4. Means of Transmission to On-Premises Supervising Station: Directly connected noncoded system.
  5. Means of Transmission to Remote Supervising Station: Digital alarm communicator transmitter (DACT), 2 telephone lines.
- C. Circuits:
1. Initiating Device Circuits (IDC): Class B, Style A.
  2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.
  3. Notification Appliance Circuits (NAC): Class B, Style W.
- D. Spare Capacity:
1. Initiating Device Circuits: Minimum 25 percent spare capacity.
  2. Notification Appliance Circuits: Minimum 25 percent spare capacity.
  3. Master Control Unit: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.
- E. Power Sources:
1. Primary: Dedicated branch circuits of the facility power distribution system.
  2. Secondary: Storage batteries.
  3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
  4. Each Computer System: Provide uninterruptible power supply (UPS).

## 2.03 COMPONENTS

- A. General:
1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
  2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Fire Alarm Control Units, Initiating Devices, and Notification Appliances: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.
- C. Master Control Unit: As specified Basis of Design Product indicated on Drawings (or approved equal).
- D. Initiating Devices:
1. Manual Pull Stations: Intelligent Addressable, Same manufacturer as FACP.
  2. Smoke Detectors: Photoelectric type, Intelligent Addressable, Same manufacturer as FACP.
  3. Heat Detectors: Intelligent Addressable, Thermal, Same manufacturer as FACP.
- E. Notification Appliances:
1. Strobes: \_\_\_\_\_.
- F. Circuit Conductors: Copper; provide 200 feet extra; color code and label.
- G. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
- H. Locks and Keys: Deliver keys to Owner.
- I. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
  2. Provide one for each control unit where operations are to be performed.
  3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
  4. Provide extra copy with operation and maintenance data submittal.
- J. Storage Cabinet for Spare Parts and Tools: Steel with baked enamel finish, size appropriate to quantity of parts and tools.
1. Padlock eye and hasp for lock furnished by Owner.

2. Locate as directed by Owner.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and the contract documents.
- B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.
- C. Obtain Owner's approval of locations of devices, before installation.
- D. Install instruction cards and labels.

### **3.02 INSPECTION AND TESTING FOR COMPLETION**

- A. Notify Owner 7 days prior to beginning completion inspections and tests.
- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- E. Provide all tools, software, and supplies required to accomplish inspection and testing.
- F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- G. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.
- H. Diagnostic Period: After successful completion of inspections and tests, Operate system in normal mode for at least 14 days without any system or equipment malfunctions.
  1. Record all system operations and malfunctions.
  2. If a malfunction occurs, start diagnostic period over after correction of malfunction.
  3. Owner will provide attendant operator personnel during diagnostic period; schedule training to allow Owner personnel to perform normal duties.
  4. At end of successful diagnostic period, fill out and submit NFPA 72 "Inspection and Testing Form."

### **3.03 OWNER PERSONNEL INSTRUCTION**

- A. Provide the following instruction to designated Owner personnel:
  1. Hands-On Instruction: On-site, using operational system.
  2. Classroom Instruction: Owner furnished classroom, on-site or at other local facility.
- B. Administrative: One-hour session(s) covering issues necessary for non-technical administrative staff; classroom:
  1. Initial Training: 1 session pre-closeout.
- C. Basic Operation: One-hour sessions for attendant personnel, security officers, and engineering staff; combination of classroom and hands-on:
  1. Initial Training: 1 session pre-closeout.
- D. Furnish the services of instructors and teaching aids; have copies of operation and maintenance data available during instruction.

### **3.04 CLOSEOUT**

- A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
  1. Be prepared to conduct any of the required tests.
  2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
  3. Have authorized technical representative of control unit manufacturer present during demonstration.

4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
  5. Repeat demonstration until successful.
- B. Occupancy of the project will not occur prior to Substantial Completion.
- C. Substantial Completion of the project cannot be achieved until inspection and testing is successful and:
1. Specified diagnostic period without malfunction has been completed.
  2. Approved operating and maintenance data has been delivered.
  3. Spare parts, extra materials, and tools have been delivered.
  4. All aspects of operation have been demonstrated to Owner.
  5. Final acceptance of the fire alarm system has been given by authorities having jurisdiction.
  6. Occupancy permit has been granted.
  7. Specified pre-closeout instruction is complete.

### **3.05 MAINTENANCE**

- A. See Section 01 7000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide to Owner, at no extra cost, a written maintenance contract for entire manufacturer's warranty period, to include the work described below.
- C. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
  2. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
  3. Record keeping required by NFPA 72 and authorities having jurisdiction.
- D. Provide trouble call-back service upon notification by Owner:
1. Provide on-site response within 2 hours of notification.
  2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
  3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.
- E. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.
- F. Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.
- G. Comply with Owner's requirements for access to facility and security.

### **END OF SECTION**

## **SECTION 31 1000**

### **SOIL MATERIALS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Subsoil Materials.
- B. Topsoil Materials.

##### **1.02 RELATED SECTIONS**

- A. Section 31 2200 – Earthwork and Site Grading
- B. Section 32 9218 – Landscape Grading.
- C. Section 32 9219 – Seeding.
- D. Section 32 9220 –Landscape Planting

##### **1.03 REFERENCES**

- A. ASTM D2487 - Classification of Soils for Engineering Purposes.
- B. NYSDOT Standard Specifications (latest edition), Section 203 - Excavation and Embankment.

##### **1.04 SUBMITTALS FOR REVIEW**

- A. Submit gradation and mechanical analysis of soil materials to Owner's Representative for approval.
- B. Materials Source: Submit name and location of imported materials source to Owner's Representative.

##### **1.05 QUALITY ASSURANCE**

- A. Perform Work in accordance with all applicable standards.

#### **PART 2 PRODUCTS**

##### **2.01 SUBSOIL MATERIALS**

- A. Excavated and re-used native material.
- B. Free of clay, rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.
- C. Satisfactory soil materials are defined as those complying with ASTM D2487, soil classification groups GW, GP, GM, SM, SW, and SP.

##### **2.02 TOPSOIL MATERIALS**

- A. Excavated and re-used native material, or imported borrow, amended as required to meet specifications.
- B. Topsoil shall be fertile, friable, natural loam, surface soil, free of subsoil, clay lumps, brush, weeds, and other litter, and free of roots, stumps, stones larger than 1/2" in any dimension, and other extraneous or toxic material harmful to plant growth. Topsoil shall not be used in a frozen or muddy condition.
- C. Topsoil shall have an acidity range of pH 5.5 to 7.5 and shall contain not less than 4% or more than 8% organic matter as determined by loss on ignition of moisture-free samples dried at 100 degrees Centigrade.

- D. Topsoil shall meet the following mechanical analysis:

<u>Sieve</u>	<u>% passing</u>
1/2" screen	100
#100 mesh	40-60
#200 mesh	40-50

- E. Conforming to ASTM D2487 Soil classification groups Symbol OH and PT.

### **2.03 SOURCE QUALITY CONTROL**

- A. Subsoil and Topsoil material shall consist of any suitable material complying with the specifications contained herein.
- B. If testing and analysis indicate materials do not meet specified requirements, change material and retest.
- C. Provide materials of each type from same source throughout the Work.

## **PART 3 EXECUTION**

### **3.01 SOIL REMOVAL**

- A. Remove turf and strip topsoil to an approximate depth of 4" under areas to be graded as shown on the grading plan. Stockpile on site and coordinate location with Owner's Representative.
- B. Cut and fill subsoil in the areas shown on the grading plan.

### **3.02 STOCKPILING**

- A. Temporarily stockpile excavated material to be reused on site where indicated by the Owner's Representative.
- B. Stockpile excavated material to be reused in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Prevent intermixing of soil types or contamination.
- E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

### **3.03 STOCKPILE CLEANUP**

- A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

**END OF SECTION**



## SECTION 31 1100

### AGGREGATE MATERIALS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Aggregate subbase material for concrete, asphalt, and stone dust pavement.
- B. Aggregate materials for gravel drip edge and dry wells.
- C. Stone for stabilized construction entrance.
- D. Utility pipe bedding and backfill.
- E. Stabilization and Filtration Geotextiles.

##### 1.02 RELATED SECTIONS

- A. Section 31 2200 – Earthwork and Site Grading.

##### 1.03 REFERENCES

- A. NYSDOT Standard Specifications (latest edition), Section 300 - Bases and Subbases, Section 703 - Aggregates.
- B. AASHTO - M147 - Materials for Aggregate and Soil-Aggregate.
- C. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- D. ASTM D2487 - Classification of Soils for Engineering Purposes

##### 1.04 SUBMITTALS FOR REVIEW

- A. Submit gradation and material analysis for ALL types of aggregate materials to Owner's Representative, for approval prior to ordering or delivering to site.
- B. Materials Source: Submit name of imported materials suppliers to Owner's Representative.

##### 1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable state and local standards.

#### PART 2 PRODUCTS

##### 2.01 COARSE AGGREGATE MATERIALS

- A. Concrete, asphalt, and stone dust pavement sub-base material: Properly graded, non-frost susceptible, crushed stone mixture, NYSDOT type 2, item 304.12 and conforming to the following gradation requirements:

<u>Sieve Size</u>	<u>Percent Passing</u>
2"	100
1/4"	30-65
#40	5-40
#200	0-10

- B. Utility pipe bedding stone, initial backfill and drainage stone: Properly graded, non-frost susceptible crushed stone mixture, NYSDOT #2 crushed stone conforming to NYSDOT 703-02 Requirements.
- C. Stabilized Construction Entrance Stone: Properly graded, non-frost susceptible crushed stone mixture, NYSDOT #4 crushed stone conforming to NYSDOT 703-02 Requirements.
- D. Final backfill material (under pavements): Properly graded, non-frost susceptible, crushed

stone mixture, NYSDOT type 2, item 304.12 and conforming to the following gradation requirements:

<u>Sieve Size</u>	<u>Percent Passing</u>
2"	100
1/4"	30-65
#40	5-40
#200	0-10

## **2.02 FINE AGGREGATE MATERIALS**

- A. Sand: Natural river or bank sand, free of silt, clay, loam, friable or soluble materials and organic matter; graded within the following limits:

<u>Sieve Size</u>	<u>Percent Passing</u>
#4	100
#14	10-100
#50	5-90
#100	4-30
#200	0

## **2.03 FILTRATION GEOTEXTILE**

- A. Filtration Geotextile: Non-biodegradable, high modulus woven polypropylene fabric that is inert to naturally encountered chemicals, alkalies and acids. Fabric shall be Mirafi 160N, or approved equal.

## **2.04 STABILIZATION GEOTEXTILE**

- A. Stabilization Geotextile: Non-biodegradable, high modulus woven polypropylene fabric that is inert to naturally encountered chemicals, alkalies and acids. Fabric shall be Mirafi 500X, or approved equal.

## **2.05 SOURCE QUALITY CONTROL**

- A. Perform testing and analysis of aggregate materials in accordance with ASTM C136.
- B. If tests indicate materials do not meet specified requirements, change material or material source and retest.
- C. Provide materials of each type from same source throughout the work.

# **PART 3 EXECUTION**

## **3.01 STOCKPILING**

- A. Stockpile materials on site as needed at locations designated by the Owner's Representative.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Direct surface water away from stockpile site so as to prevent erosion or deterioration of materials.

## **3.02 STOCKPILE CLEANUP**

- A. Prevent free standing surface water.

**END OF SECTION**

## **SECTION 31 1200**

### **SITE DEMOLITION AND CLEARING**

#### **PART 1 - GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Removal and disposal of miscellaneous surface items including, gravel driveway, berms, relocate signs, remove trees and clear vegetation, and all other debris/materials as shown on the plans and which is within the project area and adversely affects the installation and aesthetics of the new work.

##### **1.02 RELATED WORK**

- A. Examine contract documents for requirements that affect work of this section. Other sections that directly relate to work of this section include:
  - 1. Section 31 2200 Earthwork and Site Grading.
  - 2. Section 31 2501 Erosion and Sediment Control.

##### **1.03 JOB CONDITIONS**

- A. Traffic: Conduct demolition operations to ensure minimum interference with walks and streets and other adjacent properties. Do not close or obstruct streets without permission from authorities having jurisdiction.

##### **1.04 DISPOSAL OF WASTE MATERIALS**

- A. The Contractor shall remove from the site and dispose of all waste materials in a safe and legal manner.

##### **1.05 PROTECTION OF EXISTING VEGETATION TO REMAIN**

- A. Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking or skinning of roots and skinning and bruising of bark. Do not stockpile construction materials or excavated materials within drip line of trees. Avoid excess foot or vehicular traffic and parking of vehicles within drip line.
- B. Provide protection for roots over 1 1/2" diameter cut during construction operations. Coat the cut faces with an emulsified asphalt, or other acceptable coating, formulated for use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out, cover with earth as soon as possible.
- C. Repair or replace trees and vegetation damaged by construction operations intended to remain, in a manner acceptable to the Owner's Representative. Repair tree damage by a qualified Arboriculturist.

#### **PART 2 PRODUCTS**

##### **2.01 NOT APPLICABLE.**

#### **PART 3 EXECUTION**

##### **3.01 PREPARATION**

- A. Protect bench marks and survey control points from damage or displacement.

##### **3.02 UTILITIES**

- A. Utilities on and adjacent to the site in the area of demolition, whether underground or overhead, shall be protected as required to accomplish new work all in coordination and in conformance with the utility Owner. Coordinate all necessary clearing and removals. The Contractor is responsible for verifying the location of all existing underground utilities.

### **3.03 PROTECTION OF EXISTING WORK**

- A. Protect and be responsible for all existing facilities within the area of operations. Any disturbance or damage to adjacent or existing work and facilities resulting directly from this operation shall be promptly restored, repaired or replaced to the satisfaction of the Owner's Representative at no additional cost.

### **3.04 REMOVALS**

- A. Remove all items indicated to be demolished and dispose from the site in a legal manner.

### **3.05 POLLUTION CONTROLS**

- A. Use water sprinkling or other suitable methods to limit dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulations pertaining to environmental protection.
- B. Clean adjacent roads, structures and improvements of dirt, dust and debris caused by work of this section and as directed by the Owner's Representative.

**END OF SECTION**

## **SECTION 31 2200**

### **EARTHWORK AND SITE GRADING**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Strip, store and spread existing topsoil.
- B. Cutting, filling, grading, and compaction of subgrade soils.

##### **1.02 RELATED SECTIONS**

- A. Section 32 9218 – Landscape Grading.
- B. Section 32 9219 – Seeding.
- C. Section 31 2501 – Erosion and Sediment Control.

##### **1.03 REFERENCES**

- A. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- C. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures (modified proctor).
- D. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- E. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- F. ASTM 699 - Laboratory Testing.
- G. NYSDOT Standard Specifications (latest edition) section 203-3.12 compaction.

##### **1.04 SUBMITTALS**

- A. Test Reports: Submit the following reports directly to the Owner's Representative from the testing service, with copy to the Contractor:
  - 1. Test reports on borrow material including gradation and mechanical analysis.
  - 2. Verification of the subgrade suitability material to meet specified requirements.
  - 3. At least one optimum moisture-maximum density curve for each type of soil to be used or encountered.
  - 4. Field reports including in-place density tests.
  - 5. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.
- B. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

##### **1.05 QUALITY ASSURANCE**

- A. Perform earthwork and site grading in conformance with applicable requirements of governing authorities having jurisdiction.
- B. Testing and Inspection Service: Contractor shall employ and pay for a qualified independent geotechnical testing and inspection service/laboratory to perform soil testing and inspection service during earthwork operations.
- C. Testing Laboratory Qualifications: To qualify for acceptance, the geotechnical testing and

inspection service/ laboratory must demonstrate to Owner's Representative satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct required field and laboratory geotechnical testing without delaying the progress of the work.

#### **1.06 EXISTING UTILITIES**

- A. Locate existing underground and overhead utilities in the area of work before starting earthwork operations. It is the Contractor's responsibility to utilize a locating service to mark the location of all underground utilities in the project area.
- B. Where utilities are to remain in place, provide adequate means of protection and precaution against damage throughout the contract period. Conform to the requirements of the utility having jurisdiction.
- C. Should uncharted, or incorrectly charted underground or other utilities be encountered during earthwork operations, consult the utility Owner immediately for directions.
- D. Cooperate with the Owner and public and/or private utility companies in keeping their respective services and facilities in operation. Do not interrupt existing utilities serving facilities occupied and used, except when permitted in writing by the Owner's Representative, and then only after acceptable temporary utility services have been provided. Provide minimum 48 hour notice to Owner's Representative.
- E. Repair all damaged utilities to the satisfaction of the utility Owner at the Contractor's expense.
- F. Remove, plug or cap inactive or abandoned utilities encountered during construction operations. The location of such utilities shall be noted on the record drawings. Verify "inactivity" of services with involved jurisdiction before start of work.
- G. Use of explosives is not permitted.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. Topsoil: As specified in Section 31 1000.
- B. Subsoil: As specified in Section 31 1000.
- C. Aggregate Materials: As specified in Section 31 1100.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify site conditions prior to commencement of work.
- B. Verify that survey benchmark and intended elevations for the Work are as indicated.

#### **3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Protect plant life, lawns, and other features remaining as a portion of final landscaping.
- D. Protect against damage all bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs.
- E. Strip topsoil to an approximate depth of 4" and stockpile where designated by Owner's Representative.

### **3.03 SUBSOIL EXCAVATION**

- A. Excavation is unclassified, and includes excavation to subgrade elevations indicated, regardless of the character of materials and obstructions encountered.
- B. If unsuitable materials (as determined by geotechnical testing service/laboratory) are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the geotechnical testing service/laboratory. Promptly remove unsuitable material from the site.
- C. Prevent surface and subsurface water from flowing into excavations. Dewater as required. Contractor is responsible for all dewatering operations, and the disposal of the water shall be in accordance with all applicable local, state and federal regulations and as indicated on the plans.
- D. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to runoff areas.
- E. Do not excavate wet subsoil.
- F. Stockpile in area designated on site by the Owner's Representative to depth not exceeding 8 feet and protect from erosion.
- G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.
- H. Conform to elevations and dimensions within a tolerance of +0.01 feet/-0.10 feet.

### **3.04 FILLING**

- A. Remove vegetation, organic material, debris, unsuitable soils, obstructions and deleterious materials from ground surface prior to placement of fills. Break-up sloped surfaces steeper than 4:1 so that fill material will bond with existing surface.
- B. When existing ground surface has a density less than that specified for the particular area classification, break-up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to the required depth and percentage of maximum density.
- C. Fill areas to contours and elevations with unfrozen materials.
- D. Place fill material on continuous layers, not exceeding 8 inches in loose depth for material to be compacted by heavy compaction equipment and not more than 4" in loose depth for material to be compacted by hand-operated equipment, and compact.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Make grade changes gradual. Blend slope into level areas.

### **3.05 GRADING**

- A. Uniformly grade areas within the limits shown on the plans. Smooth finish surfaces within specified tolerances. The degree of finish required will be that ordinarily obtainable from either blade grader or scraper operations.
- B. Shape the surface to line, grade and cross-section as shown on the plans, with the finish surface not more than 0.10 foot above or below required subgrade elevation, compacted as specified, and graded to prevent ponding of water after rains. Include such operations as plowing, discing and any moisture or aerating required to provide the optimum moisture content for compaction. Fill low areas resulting from removal of unsatisfactory soil materials, obstructions and other deleterious materials, using satisfactory soil material.
- C. Before placing fill, proof roll subgrade thoroughly using a 10-ton roller with two passes, the

second pass perpendicular to the first.

### **3.06 COMPACTION**

- A. Control soil compaction during construction, providing the minimum percentage of density specified for each area classification indicated below.
- B. Compact soil to not less than the following percentages of maximum density in accordance with ASTM D 1557 Modified Proctor:
  - 1. Planting and/or Lawn Areas: Compact top 6" of subgrade and each layer of fill material at 90% maximum density.
  - 2. Pavements and Building Slab Areas: Compact top 12" of subgrade and each layer of fill area at 95% maximum density.
- C. All subgrades shall be compacted with an approved method as specified in NYSDOT Standard Specification section 203-3.12.
- D. Moisture Control:
  - 1. Where the subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to the surface. Prevent free water appearing on the surface during or subsequent to compaction operations.
  - 2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
  - 3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread to allow to dry. Assist drying by discing, harrowing or pulverizing until the moisture content is reduced to a satisfactory value.

### **3.07 FIELD QUALITY CONTROL**

- A. Testing: Geotechnical testing service/laboratory retained by the Contractor shall inspect, test, and approve each in-place subgrade layer before further backfill work is performed. Testing service shall review and test material and determine optimum moisture at which maximum density can be obtained in accordance with ASTM D1557.
- B. Perform field density test in accordance with ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method) or ASTM D 2922 (nuclear method).
- C. If tests indicate work does not meet specified requirements, Contractor shall remove work, replace and retest.
- D. Frequency of Tests: In each compacted soil fill layer, make one field density test for each lift every 2,000 sq. ft. of fill area. In pipe trenches, make one field density test for each 100 lineal feet of trench.

### **3.08 MAINTENANCE**

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades in settled, eroded and rutted areas to the specified tolerances. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape and compact to the required density prior to further construction.

### **3.09 SETTLING**

Where settling is measurable or observable at graded areas during the general project warranty period, remove surface (pavement, lawn or other surface), add backfill material, compact and replace surface treatment. Restore appearance, quality and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

**END OF SECTION**



**SECTION 31 2301**  
**EXCAVATION, BACKFILL, AND COMPACTION (BUILDING AREA)**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.
  - 1. Refer to Division 1 for applicable local codes and regulations.

**1.2 DESCRIPTION OF WORK**

- A. This section pertains to an area bounded by 20-feet-minimum outside of and parallel to the exterior walls of the building, including canopies, porches, and other structures attached to the building.
- B. This work includes the following:
  - 1. Preparing subgrade for building slabs, walks, and pavements.
  - 2. Preparing subbase for support of building slabs.
  - 3. Excavating and backfilling for building structure.
  - 4. Excavating and backfilling of trenches within building lines.
  - 5. Excavating and backfilling for underground mechanical and electrical utilities and buried mechanical and electrical appurtenances.
  - 6. Excavating and backfilling for Mechanical/Electrical Work. Refer to mechanical and electrical sections for excavation and backfill required in conjunction with underground mechanical and electrical utilities and buried mechanical and electrical appurtenances.
  - 7. Final grading and placement and preparation for topsoil for lawns and planting are specified in Division 310000 – Site Earthwork.

**1.3 QUALITY ASSURANCE**

- A. Comply with: New York State Department of Transportation (NYSDOT) “Standard Specifications for Construction and Materials.”
- B. Routine testing of existing soils and compacted material for compliance with these specifications will be performed as part of Special Inspections.
  - 1. Compacted material not meeting density requirements shall be removed or recompacted and retested at Contractor’s expense.

**1.4 SPECIAL INSPECTIONS**

- A. Refer to Specification Section 01 4533 and Schedule of Special Inspections.

## 1.5 MATERIAL EVALUATION/QUALITY CONTROL

- A. Preconstruction Testing: Contractor shall employ Testing Agency acceptable to Engineer and Architect to perform the following services:
  - 1. Test materials proposed for use by Contractor to verify specified requirements.
    - a. Determine optimum moisture at which maximum density can be obtained in accordance with ASTM D 1557, Modified Proctor.
    - b. Perform particle size analysis in accordance with ASTM D 422.
- B. Submit Testing Agency qualifications demonstrating experience with similar types of projects.
- C. The RDP for Geotechnical Engineering shall perform the following:
  - 1. Identify soils requiring undercutting and replacement while observing proof rolling and when subgrade is exposed.
  - 2. Verify footing bearing strata.
  - 3. Review and accept materials proposed by Contractor for use as compacted fill based on test data and information submitted by preconstruction Testing Agency. Architect shall coordinate review of submittals.
  - 4. Observe and accept filling and compaction procedures.
  - 5. Review and approve preparation of slab-on-grade subgrade and subbase.
- D. Geotechnical Engineer shall submit copies of reports to Special Inspector, Engineer, Architect, Construction Manager, and Contractor. Include date of site visit, description of work observed, and summary of observations and recommendations.

## 1.6 SUBMITTALS

- A. Submit to RDP for Geotechnical Engineering:
  - 1. Gradations for proposed fill materials and mix design proposed for flowable fill at least 15 days before start of backfilling. Flowable fill submittal shall include ASTM C 1260 test results.
  - 2. Product data, specifications, and installation instructions for proprietary materials.
  - 3. Material certifications for products specified to conform with NYSDOT references and ASTM references.
- B. Prior to placement of slab on grade, submit to Special Inspector and RDP for Structural Engineering a written protection program for vapor retarder, slab subbase, and slab on grade for record only.

## 1.7 DEFINITIONS

- A. Excavation: Removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.

- B. Unauthorized Excavation: Removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect. Unauthorized excavation and remedial work directed by Architect shall be at Contractor's expense.
  - 1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position when acceptable to Architect.
  - 2. In locations other than those above, backfill and compact unauthorized excavations as specified for authorized excavations of same classification unless otherwise directed by Architect.
- C. Additional Excavation: If RDP for Geotechnical Engineering determines bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered. Replace excavated material as directed by Geotechnical Engineer.
  - 1. Removal of unsuitable material and replacement as directed will be paid on basis of conditions of contract relative to changes in work.
- D. Subgrade: Undisturbed earth or compacted soil layer immediately below granular subbase, base of structure, or topsoil materials.
- E. Structure: Buildings, foundations, slabs, tanks, curbs, or other man-made stationary features occurring above or below ground surface.

## 1.8 PROJECT CONDITIONS

- A. Site Information: Subsurface investigation reports were used for basis of design and are available to Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.
  - 1. Additional test borings and other exploratory operations may be performed by Contractor at Contractor's option; however, no change in contract sum will be authorized for additional exploration.
- B. Existing Utilities: Locate existing underground utilities in work area before starting earthwork operations. Where utilities are to remain in place, provide adequate means of protection during earthwork operations.
  - 1. If uncharted or incorrectly charted piping or other utilities are encountered during excavation, consult with utility owner and Architect immediately for directions. Cooperate with Owner and public and private utility companies to keep services and facilities in operation. Repair damaged utilities as required by utility owner.

2. Do not interrupt existing utilities serving facilities occupied by Owner or others during occupied hours except when permitted in writing by Architect and then only after acceptable temporary utility services have been provided.
  - a. Provide minimum 48-hours notice to Architect and receive written notice to proceed before interrupting utilities.
3. Demolish and remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.

C. Use of Explosives: Do not bring explosives onto site or use in work.

D. Protection of Property: Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

## 1.9 PRODUCT HANDLING

A. Store materials so as to preserve their quality and fitness for work.

## 1.10 WORKMANSHIP

A. Contractor shall be responsible for correction of work not conforming to specified requirements. Correct deficient work as directed by Architect.

B. Remove work found to be defective. Replace with new acceptable work.

# PART 2 - PRODUCTS

## 2.1 MATERIALS

A. General Fill Material: Soil materials free of clay, rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

B. Flowable Fill Material: Cementitious, flowable, excavatable, backfill material having a compressive strength of 50 to 100 pounds per square inch (psi) at 28 days. Provide mix that minimizes shrinkage and is non-expansive.

- C. Structural Fill: Sound and durable sand and gravel, free of deleterious materials such as pyritic shale, organics, or contaminants of a chemical, mineral, or biological nature and conforming to the following limits of gradation:

Percent Passing by Weight	Sieve Size
100	3 inch
90 – 100	2 inch
75 – 90	3/4 inch
35 – 65	1/4 inch
5 – 40	No. 40
0 – 8	No. 200

- D. Subbase Material: Sound and durable sand and gravel, free of organic and other deleterious materials, conforming to New York State Department of Transportation, paragraph 304-1.02, Type 2 or 4.
- E. Drainage Fill: Washed crushed stone or crushed or uncrushed gravel conforming to NYSDOT Section 703-02, size 2.
- F. Cushion Sand: Comply with requirements of NYSDOT Section 703-06.
- G. Bedding: Comply with the requirements of NYSDOT Section 703-02, material requirements, crushed stone (703-0201).
- H. Filter Fabric: “Geotex 351” by Propex Geosynthetics; “Mirafi 140N” by Mirafi, Inc.; or accepted equivalent.
- I. Soil Stabilization Geotextile: “Geotex 315ST” by Propex Geosynthetics; “Mirafi 600X” by Mirafi, Inc.; or accepted equivalent.
- J. Excavated Materials: Do not use as structural fill or subbase material. Do not use as general fill material unless accepted by Geotechnical Engineer.
- K. Vapor Retarder: Provide vapor retarder cover over prepared subbase material where indicated below slabs on grade. Use only materials that are resistant to deterioration when tested in accordance with ASTM E 154 as follows:
1. Polyolefin not less than 15 mils thick, in compliance with ASTM E 1745 Class A and with a perm rating less than 0.02 perms. “Stegowrap 15 mil Class A” by Stego Industries LLC; “Moistop Ultra 15” by Fortifiber Building Products; “Griffolyn 15 Mil Green” by Reef Industries, Inc.; or “Vapor Block 15” by Raven Industries.
  2. Provide manufacturer’s-recommended, pressure-sensitive/water-resistant seam tape and mastic for vapor retarder selected.
- L. Foundation Drainage Pipe: Perforated Polyvinyl Chloride (PVC) Pipe conforming to ASTM D 3034, SDR 35, size as noted on the Drawings. Provide bends, reducers, adapters, couplings, collars, and joint materials as required.

## **PART 3 - EXECUTION**

### **3.1 JOB CONDITIONS**

- A. Examine substrates and conditions under which work shall be performed. Do not proceed with work until unsatisfactory conditions are corrected.
- B. Maintain drainage and restrict traffic within building area during construction to maintain integrity of subgrade. Failure to observe these precautions will require Contractor to remove disturbed areas and correct at his expense.

### **3.2 COLD-WEATHER PROTECTION**

- A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

### **3.3 REMOVALS**

- A. Clear, grub, and strip site of vegetation, topsoil, and other organic materials.
- B. Remove brick fragments and other construction debris. Plow-strip or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material can bond with existing surface.
  - 1. When existing ground surface has a density less than that specified for a particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.
- C. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash, and debris. Legally dispose off Owner's property.

### **3.4 PROOF ROLLING**

- A. Following stripping and removing miscellaneous fill, grade and compact exposed subgrade. Proof roll subgrade by making five passes across building area in each direction using smooth-drum vibrating roller having static weight of 10 tons minimum.
- B. Undercut soft spots that develop during proof rolling and replace with compacted structural fill. Contractor shall be paid for this work on unit cost basis.
- C. Do not perform proof rolling during or immediately after periods of inclement weather.

### **3.5 EXCAVATION**

- A. Excavation shall be considered unclassified and understood to mean all materials encountered during excavation.

- B. Excavations shall be laid back or sheeted and braced to prevent sloughing in of sides. Maintain sides and slopes of excavations in stable condition until completion of backfill. Incline cut slopes no steeper than permitted by OSHA standards for excavations in soil type(s) encountered.
- C. Hand trim foundation excavations to remove loose soil or ridges of materials left by equipment.
- D. Keep loose material and debris out of excavations.
- E. For pile foundations, stop excavations from 6 inches to 12 inches above bottom of footing before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete grade beams.
- F. Shoring and Bracing: Provide materials for shoring and bracing, including sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.

### 3.6 DEWATERING

- A. Dewatering activities shall conform to Stormwater Pollution Prevention Plan (SWPPP) implemented by site operator if required as a condition of construction permit.
- B. Perform excavation and filling in manner and sequence to provide proper drainage at all times.
- C. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.
  - 1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting of footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
  - 2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rainwater and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

### 3.7 STORAGE OF EXCAVATED MATERIALS

- A. On-site storage of excavated materials shall conform to Stormwater Pollution Prevention Plan (SWPPP) implemented by site operator if required as condition of construction permit.

- B. Stockpile excavated materials acceptable for reuse. Place, grade, and shape stockpiles for proper drainage.
  - 1. Locate and retain soil materials away from edges of excavations. Do not store within drip lines of trees indicated to remain.
  - 2. Dispose of excess excavated soil material and materials not acceptable for use as general fill.

### 3.8 TRENCH EXCAVATION FOR PIPES AND CONDUIT

- A. Excavate trenches to uniform width sufficiently wide to provide ample working room and minimum of 6 to 9 inches of clearance on both sides of pipe or conduit.
- B. Do not locate trenches that are deeper than adjacent footings closer horizontally to footing than vertical distance separating bottom of trench and bottom of footing.
- C. Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
  - 1. For pipes or conduit less than 6 inches in nominal size and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.
  - 2. For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 90 degrees (bottom 1/4 of the circumference). Fill depressions with bedding or tamped cushion sand backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads to ensure continuous bearing of pipe barrel on bearing surface.

### 3.9 VAPOR RETARDER INSTALLATION

- A. General: Do not begin installation of vapor retarder and slab subbase until protection is in place. See requirements in Section 03 3020. Following placement and compaction of subbase, place vapor retarder sheeting with longest dimension parallel with direction of concrete slab placement.
- B. Install vapor retarder in accordance with ASTM E 1643, manufacturer's instructions, and as follows:
  - 1. Lap joints 6 inches, and seal vapor retarder joints with manufacturer-recommended seam tape.
  - 2. Extend vapor retarder up walls and penetrations 4 inches minimum.
  - 3. Seal vapor retarder to walls and penetrations with manufacturer-recommended mastic to form continuous barrier.



- 4. Repair damaged areas by cutting patches of vapor retarder material and placing to overlap damaged areas by 6 inches each side. Seal each side of patch with seam tape.
- C. After vapor retarder placement, cover with slab subbase and compact as specified to depth shown in drawings.
- D. Do not allow subbase material to become wet prior to or after slab placement.

### 3.10 FILLING, BACKFILLING, AND COMPACTION

- A. Do not place fill material on surfaces that are muddy, frozen, or contain frost or ice.
- B. Place soil stabilization geotextile below structural fill where shown in drawings after subgrade has been approved and before placement of fill material.
- C. Use structural fill to increase grades within building areas, as interior backfill against foundations and in trenches, as exterior backfill against walls with footing drains and as exterior backfill where pavement or walkways abut building.
- D. Contractor may use flowable fill to increase grades and as interior backfill against foundations and in trenches. Allow fill to cure for at least 7 days before setting forms for concrete foundations or placing slab on grade.
- E. Use subbase material directly below slabs and pavements as shown in drawings.
- F. Use general fill material to increase grades outside building area except as otherwise specified.
- G. Use drainage fill around footing drains as detailed in drawings. Wrap drainage fill with filter fabric.
- H. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and are carried below bottom of such footings or pass under wall footings. Place concrete to level of bottom of adjacent footing.
- I. Backfill trenches with concrete or flowable fill where trench excavations pass within 18 inches of and are carried below bottom of installed or existing grade beams or that pass under grade beams. Place concrete to level of bottom of adjacent grade beam.
- J. Backfill foundation excavations as soon as possible following construction of foundations and foundation walls.
- K. Backfill and fill against foundation walls evenly on both sides to prevent displacement of construction. For walls with fill on one side only, do not backfill until concrete has achieved 70 percent of its design strength and walls have been braced.

- L. Begin filling in lowest section of area.
- M. Place fill 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.
- N. Lifts or portions thereof not compacted in accordance with specifications shall be recompacted or removed and replaced to meet compaction requirements.
- O. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density in accordance with ASTM D 1557, Modified Proctor:
  - 1. Under structures, footings, foundations, building slabs, and steps: Compact top 12 inches of subgrade and each layer of fill material to 95 percent.
  - 2. Under pavements: Compact top 12 inches of subgrade and each layer of fill material to 95 percent.
  - 3. Subbase Material: Compact to 95 percent with moisture content no greater than 2 percent wet of optimum.
  - 4. Under walkways: Compact top 6 inches of subgrade and each layer of fill material to 95 percent.
  - 5. Under lawn or unpaved areas: Compact top 6 inches of subgrade and each layer of fill material to 90 percent.
  - 6. Cushion sand: Compact to 100 percent.
- P. Where a power roller is used for compaction, do not approach nearer than 10 feet from walls of new or existing construction.
- Q. Moisture Control: Where subgrade or layer of soil material must be moisture-conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.
  - 1. Remove and replace or scarify and air dry soil material too wet to permit compaction to specified density.
  - 2. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to satisfactory value.

### 3.11 TOLERANCES

- A. Excavation for structures shall conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot except to facilitate drainage during construction stage.

- B. Surface of subbase under building slabs shall be graded smooth and even, free of voids, and rolled to required elevation. Provide final grades within tolerance of 1/2 inch when tested with 10-foot straightedge.

**END OF SECTION 31 2304**

## SECTION 31 2501

### EROSION AND SEDIMENT CONTROL

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Provide all labor, equipment and materials necessary to install and maintain erosion & sediment control measures including, sediment control fence, stabilized construction entrance, temporary seeding, tree protection fence, dust control and construction sequencing.
- B. Provide all labor, equipment and materials necessary to implement erosion control measures, as required by regulatory permits, and as job conditions dictate. The Owner will retain the services of a qualified professional to inspect and report on erosion control activities.

##### 1.02 RELATED SECTIONS

- A. Section 31 2200: Earthwork and Site Grading

##### 1.03 REFERENCES

- A. New York State Standards and Specifications for Erosion and Sediment Control, latest edition.

##### 1.04 SUBMITTALS FOR REVIEW

- A. Shop Drawings and Product Data. Submit manufacturer's technical product data for all erosion and sediment control products.
- B. Designate erosion control and maintenance activities on the submitted Project Schedule.

##### 1.05 QUALITY ASSURANCE

All Erosion/Sediment Control activities performed by the contractor shall be in compliance with the following standards of practice:

- A. New York State Standards and Specifications for Erosion and Sediment Control published by NYS Soil and Water Conservation Committee.
- B. USDA Soil Conservation Service "Guidelines for Urban Erosion and Sediment Control", latest revision.
- C. Local Guidelines for Erosion and Sediment Control.
- D. NYSDOT Specifications.

##### 1.06 SEQUENCING AND SCHEDULING

- A. Place erosion control measures wherever shown on the Contract Drawings before beginning any other Work of this Contract.
- B. Place other erosion control measures shown on the Contract Drawings as soon as possible, relative to other Work of this Contract including, but not limited to, the following:
  - 1. At grading limits, before beginning rough grading.
  - 2. At drain inlets, as soon as backfill is compacted and frame and grate are installed.
  - 3. At all disturbed ground and subgrade as specified.

##### 1.07 FINES FOR VIOLATIONS: Permits and their conditions are part of the Contract Documents and failure to implement these conditions and the requirements of this Contract may result in the

issuing agency levying a fine for violating the terms of the permit. The Owner's Representative is the permittee on these permits and, therefore, would be fined for such violations. Recognizing that it is the responsibility of each pertinent contractor to abide by permit and contractual requirements, each pertinent contractor shall reimburse the Owner's Representative the full amount of all fines levied on account of the pertinent contractor's failure to abide by those requirements.

## **PART 2 - PRODUCTS**

### **2.01 SEDIMENT CONTROL FENCE**

- A. The sediment control fence fabric shall meet the following specifications:

<u>Fabric Properties</u>	<u>Minimum Acceptable Value</u>	<u>Test Method</u>
Grab Tensile Strength (lbs)	90	ASTM D1682
Elongation at Failure (%)	50	ASTM D1682
Mullen Burst Strength (psi)	190	ASTM D3786
Puncture Strength (lbs)	40	ASTM D751
Slurry Flow Rate (gpm/sf)	0.3	
Equivalent Opening Size	40-80	US Std Sieve
Ultraviolet Radiation Stab. (%)	90	ASTM G26

- B. Fence Posts: The length shall be a minimum of 36" long. Wood posts shall be of a sound quality hardwood with a minimum cross-sectional area of 2.0 square inches.

### **2.02 TEMPORARY GRASS**

- A. Temporary grass shall be quick growing species suitable to the area and as a temporary cover which will not compete with the grasses sown later for permanent cover.

- B. Seed Mixtures

1. Temporary Seeding

	<u>Type</u>	<u>Lbs./Acre</u>	<u>Lbs./1000SF</u>
a.	Annual Rye grass	80	1.9
b.	<u>Winter Ryegrass</u>	100	2.5

Use winter rye if seeding in October/November.

### **2.03 STABILIZED CONSTRUCTION ENTRANCE**

- A. Stabilization geotextile and stone: See section 31 1100.

### **2.04 TREE PROTECTION FENCE**

- A. 4' high orange plastic snow fence with steel fence posts.

## **PART 3 - EXECUTION**

### **3.01 EROSION AND SEDIMENT CONTROL**

- A. Erosion and sediment controls must be constructed, stabilized and functional before site disturbance within the tributary area to those controls.
- B. Upon completion of installation of the erosion and sediment controls, the site will be inspected and any areas identified with a significant erosion potential will receive fortified erosion control measures, as determined by the Owner's Representative or other Agency having jurisdiction.

- C. The Contractor shall utilize diversionary tactics for containing runoff and directing it towards erosion control devices as needed to minimize sedimentation. Existing curbs shall also be used to divert clean runoff away from inlets.
- D. All erosion and sediment control devices must be maintained in working order until the site is stabilized. All preventative and remedial maintenance work, including clean out, repair, replacement, re-grading, re-seeding, re-mulching, or re-netting, must be performed immediately.
- E. Any disturbed area on which activity has ceased must be stabilized immediately. During non-germinating periods, mulch must be applied at the recommended rates.
- F. After final stabilization has been achieved, temporary erosion and sediment controls must be removed. Areas disturbed during removal shall be stabilized immediately.

**3.02** Contractor shall implement erosion control measures as shown on the plans and as job conditions dictate. Intent is to minimize erosion and pollutants at the source, capture sediment at regular intervals and prevent sediment intrusion into storm sewer pipes, structures, and waterways. Work includes, but is not limited to, mulching, temporary silt fences, filter fabric, expeditious grading, stormwater diversion, prompt turf and plant establishment, and maintenance of same.

**3.03** The Contractor shall initiate stabilization measures as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. If disturbed soils surfaces are to be left exposed for a period of greater than 14 days, stabilize the soil with temporary seeding and/or mulch to limit erosion. Where the initiation of stabilization measures by the 14<sup>th</sup> day after construction activity temporarily or permanently ceased is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practicable. The onset of seasonally adverse weather is not intended as our excuse for not implementing the necessary erosion controls. The Contractor shall use foresight in his activities to only disturb areas that he can stabilize before adverse weather conditions prevail. The Contractor is encouraged to schedule his work such that final land surface restoration closely follows initial disturbance to the maximum extent possible in order to limit bare soil exposure and dependence on the temporary systems discussed above.

**3.04** Sediment shall be removed from sediment fences whenever their capacity has been reduced by fifty (50) percent from the design capacity and/or as required to ensure intent. Prior to fine grading and restoration, the Contractor shall remove and dispose of accumulated sediments and silts as required.

### **3.05 AUTHORITY OF WORK**

- A. The Owner's Representative has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, the surface area of erodible earth material exposed by excavation, borrow and fill operations and to direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams or other watercourses/waterbodies.

### **3.06 POLLUTION CONTROL**

- A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations. Promptly repair equipment leaks. Provide equipment and personnel to perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.
- B. Notify the Owner's Representative if contaminated soil, groundwater or other forms of pollution are encountered. Excavate and dispose of any contaminated earth immediately in accordance with Federal, State and local regulations off-site, and replace with suitable compacted fill.

- C. Pollutants such as fuels, lubricants, bitumen's, raw sewage and other harmful materials shall not be discharged into or near rivers, streams, and impoundments or into natural or man-made channels leading thereto. Wash water or waste from concrete mixing operations or trucks shall not be allowed to enter live streams.

### **3.07 DEWATERING AND WASHWATERS**

- A. Water from aggregate washing, equipment washing, dewatering or other operations containing sediment, shall be treated by filtration, settling basin, silt bags or other means sufficient to reduce the turbidity, so as not to cause a substantial visible contrast to natural conditions.

### **3.08 SEDIMENT CONTROL FENCE INSTALLATION**

- A. A silt fence shall be used where shown on the plans and subject to the following conditions:

1. Maximum allowable slope lengths contributing runoff to a silt fence are:

<u>Slope Steepness</u>	<u>Maximum Slope Length (Ft)</u>
2:1	50
3:1	75
4:1	100
5:1	150
Flatter than 5:1	150 or as shown on the plans

2. Maximum drainage area for overland flow to a silt fence shall not exceed 1/4 acre per 100 feet of fence.
3. Erosion would occur in the form of sheet erosion.
4. There is no concentration of water flowing to the barrier.

- B. Embed silt fence material a minimum of 8 inches below finished grade.

- C. When two sections of filter cloth adjoin each other, they shall be overlapped by six inches and folded.

- D. Maintenance shall be performed as needed and material removed when abulges develop in the silt fence, or when 6 inches of sediment has accumulated against it, whichever occurs first. All sediment barriers shall be repaired or replaced when they no longer function as a barrier.

### **3.09 CONSTRUCTION OPERATIONS**

- A. When borrow material is obtained from other than commercially operated sources, erosion of the borrow site shall be so controlled, both during and after completion of the work, so that erosion will be minimized and sediment will not enter streams or other bodies of water. Waste or disposal areas and construction roads shall be located and constructed in a manner that will minimize sediment-entering streams. Install sediment containment devices around stockpiles and waste areas. Stabilize the surface of temporary haul roads to minimize sediment creation.

### **3.10 CONSTRUCTION PHOTOGRAPHS**

- A. The Contractor shall take good quality photographs of streams, ditches, channels, ponds or other water bodies immediately adjacent to project work area that will receive runoff from construction activity. Document existing conditions such as existing sediment deposition, water turbidity, eroded streambed/streambanks and condition of vegetation.

### **3.11 CONSTRUCTION SCHEDULE**

- A. Prior to beginning construction, the Contractor shall submit a detailed project schedule which outlines his program for controlling erosion, limiting conveyance of silt and sediment, pollution prevention, maintenance of devices/controls, and restoration of graded surfaces for the duration of the project and the one-year warranty period, for review and acceptance.

### **3.12 FINAL STABILIZATION**

- A. Final stabilization is defined as all soil disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of at least 80% has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

### **3.13 REMOVAL OF TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES**

- A. Remove erosion control devices when final stabilization has occurred for the respective areas of the site and are no longer needed.

### **3.15 CONTRACTOR'S RESPONSIBILITY**

- A. The actual scheduling and implementation of the erosion and sediment control plan and devices shown are considered to comprise the majority of efforts needed, but not necessarily all that will be required. Weather, Contractor's schedule, extent of disturbance, site and unforeseen conditions can dictate that greater efforts will be necessary.

**END OF SECTION**



**SECTION 31 6333**  
**DRILLED MICROPILES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this section.
- B. Section 31 2301: Structural Excavation, Backfill, and Compaction (Building Area).
- C. Section 03 3000: Cast-In-Place Concrete.

**1.2 DESCRIPTION OF WORK**

- A. This section includes installation of deep foundation units consisting of drilled, reinforced, grouted, straight-shaft piles bearing in underlying competent soil or rock strata. The following items are specifically included without limiting the generality implied by these specifications:
  - 1. Excavation, dewatering, and removal of excavated material and cuttings inside piles as shown in drawings.
  - 2. Steel liners or casings.
  - 3. Reinforced grout.
  - 4. Pile load test.

**1.3 QUALITY ASSURANCE**

- A. Reference Standards:
  - 1. 2000 FHWA "Micropile Design & Construction Guidelines - Implementation Manual, Publication No. FHWA-SA-97-070."
  - 2. ACI 543R "Recommendations for Design, Manufacture and Installation of Concrete Piles."
  - 3. PTI "Recommended Practice for Grouting of Post-Tensioned and Prestressed Concrete" and "Recommendations for Soil and Rock Anchors."
  - 4. ACI 301 "Specifications for Structural Concrete."
  - 5. ASTM D1143 "Standard Test Method for Piles Under Static Axial Compressive Load."
  - 6. *Building Code of New York State* (BCNYS), current Edition, "Section 1808–Pier and Pile Foundations."
- B. Work shall conform to generally accepted engineering and construction practices for construction of drilled and grouted micropiles.

C. Installation shall be performed by Contractor with at least five years experience in work of this type and scope. As a minimum, Contractor shall submit satisfactory evidence of successful completion of at least three drilled, reinforced, grouted, straight-shaft pile installation projects comparable in scope to this project. Contractor's qualifications shall include use of suitable equipment and competent personnel for work of this type and scope. Provide the following:

1. Written statement verifying experience in this type of work and competence and experience of person in charge at site.
2. Written statement naming at least three comparable installations within the past five years. Identify design consultant's and Owner's names.
3. Written description of equipment and methods used.
4. Difficulties encountered and how they were overcome.
5. Results of testing performed.

#### 1.4 SPECIAL INSPECTIONS

A. Refer to Specification Section 01 4533 and Schedule of Special Inspections.

#### 1.5 MATERIAL EVALUATION/QUALITY CONTROL

- A. Preconstruction Testing: Contractor shall employ a Testing Agency acceptable to Engineer and Architect to perform material evaluation tests and to evaluate grout mixes prior to submitting.
- B. Testing Agency Qualifications: Independent Testing Agency shall demonstrate to Architect's satisfaction that it has experience and capability to satisfactorily perform testing indicated without delaying progress of work.
- C. Provide pile location plan showing location and designation of each pile.
- D. Perform load test for control test piles in accordance with ASTM D1143 and under supervision of Special Inspector.
- E. The Registered Design Professionals (RDPs) for Geotechnical and Structural Engineering will visit the construction site at appropriate intervals to determine if work is in general conformance with Contract Documents and specifications. Notify RDPs 48 hours before anticipated time of completion of work for a given section of work so that they may determine if site observations are required. If site observations are required, do not install grout until the RDPs have had an opportunity to observe reinforcement and subgrade conditions.

#### 1.6 SUBMITTALS

- A. At least 14 days before proposed start of work, Contractor shall submit description of proposed drilling equipment and installation procedure, description and details of proposed pile construction and casing, and methods for review and acceptance.

- B. Submittal shall be prepared and stamped by a New York State registered Professional Engineer experienced in geotechnical engineering. Submittal shall include the following information:
1. Stamped design calculations and shop drawing for piles.
  2. Size, wall thickness, type of steel, and length of casing or liners if used.
  3. Drawings and details describing proposed sequence of drilled shaft installation.
  4. Information describing type of equipment to be used, including drill rig, augers, drilling tools, final cleaning equipment, desanding equipment, slurry pumps, sampling equipment, tremies or grout pumps, casing (including casing dimensions, material and splice details, etc.), centralizers, etc.
  5. Details and method of grout placement, curing, and protection.
  6. Method of reinforcement placement, including support and centralization type and methods.
  7. Proposed method for cleaning out shaft excavations. Include description of how spoils will be removed and disposed off-site.
  8. Method describing how work will progress through obstructions and rock.
  9. Procedure for filling voids between permanent casing and soil.
  10. If slurry is to be used, indicate method proposed to mix, circulate, desand, remove, and dispose of slurry.
  11. Emergency construction joint procedure to be used in event grout placement or drilled pile is unexpectedly interrupted.
  12. Contractor shall submit description of proposed load test equipment and procedure. Load test mechanism shall be designed by a Professional Engineer licensed in New York State.

## 1.7 PROJECT CONDITIONS

- A. Site Subsurface Information: A geotechnical evaluation was prepared and used for the basis of design and is available for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. The Owner makes this boring data available for information only and does not guarantee its accuracy or consistency. It is Contractor's responsibility to make interpretations and draw conclusions on the character of materials encountered and impact on work based on his expert knowledge of pile installation techniques.
- B. Contractor shall examine site and familiarize himself of conditions affecting work.
- C. Contractor shall assume responsibility of existing surface and subsurface conditions insofar as they affect work and shall make no claim against Owner based on misunderstanding or misinterpretation of existing conditions.
- D. If uncharted or incorrectly charted piping or other utilities are encountered during excavation, consult Architect immediately for directions as to procedure.
- E. Cooperate with Owner and public or private utility companies to keep their respective services and facilities in operation.

- F. If damage occurs to utilities, repair damaged utilities to satisfaction of utility company.
- G. Do not bring explosives onto site or use in work.
- H. See Division 1 Section “Temporary Facilities” for water.

#### 1.8 DRILLED MICROPILE REQUIREMENTS

- A. Loads applied to micropiles from building structure and foundation are indicated in drawings.
- B. Allowable end bearing values are provided in the Geotechnical Report and are indicated in drawings.
- C. Provide steel liners or casings as required.
- D. Pile dimensions and reinforcing shall be selected by the Drilled Pile Contractor in accordance with ACI 543R “Design, Manufacture, and Installation of Concrete Piles” and Section 1810 of the BCNYS and submitted for review and acceptance by Architect, Engineer, and Geotechnical Engineer.
- E. Steel reinforcing in compression piles may consist of reinforcing steel, steel pipe encased in grout or permanent full-length casing. The full length of the pile shall contain either steel pipe or steel reinforcing.
- F. Reinforcing steel in tension piles shall be centered in pile and extend full-length through grout to bottom of pile. Provide at least 2½ inches of side cover for uncased piles and at least 1 inch of side cover for cased piles. Reinforcing shall extend into grade beam and be anchored by means of ACI 90 or 180 degree hook, tension lap splice, or mechanical anchorage to resist loads indicated.
- G. Piles resisting lateral loads shall be reinforced for flexure to a depth as determined by the Contractor’s Engineer. Reinforcing shall consist of reinforcing steel or steel pipe encased in grout or permanent full-length casing.

#### 1.9 PRODUCT HANDLING

- A. Store materials so as to preserve their quality and fitness for work. Store reinforcement and casings in manner to prevent damage and accumulation of dirt.

#### 1.10 WORKMANSHIP

- A. Contractor shall be responsible for correction of work not conforming to specified requirements, including strength and tolerances. Correct deficiencies as directed by the RDPs for Geotechnical and Structural Engineering.
- B. Remove work found to be defective. Replace with new acceptable work.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Grout Mix Design: Mixture of Portland cement (ASTM C 150), sand (ASTM C 404), and water proportioned and mixed to maintain solids in suspension without appreciable water gain and flowable to provide good bonding in bearing stratum.
  - 1. ASTM C 109, 28-day minimum compressive strength of 5,000 psi.
  - 2. Clean, potable water, free of harmful quantities of substances known to degrade Portland cement or reinforcing steel.
  - 3. Admixtures, if utilized, in accordance with manufacturer's recommendations and ASTM C 494.
- B. Reinforcing Steel: ASTM A 615, Grade 60 or 75, or ASTM A 722 Grade 150. Free of rust, grease, oil, or other objectionable material.
- C. Temporary and permanent steel casings and reinforcing steel pipe shall conform to ASTM A 252, Grade 3 except:
  - 1. Minimum yield strength shall be 50,000 psi.
  - 2. Minimum wall thickness shall be 3/16-inch.
- D. Plates and Shapes: For pile top attachments, ASTM A 36 or A 572, Grade 50.
- E. Centralizers: Plastic, steel, or material nondetrimental to reinforcing steel and grout.

## **PART 3 - EXECUTION**

### **3.1 JOB CONDITIONS**

- A. Examine conditions under which drilled piles shall be placed. Do not proceed with work until unsatisfactory conditions are corrected.

### **3.2 INSTALLATION PROCEDURE**

- A. Construction methods selected are directly related to method of load transfer assumed in project design. Type of drilling method, presence of permanent casing, and procedure for clean out of shaft affects load transfer behavior in skin friction and end bearing. Construct drilled piles using construction methods consistent with load transfer mechanism shown in drawings.
- B. Drilled and grouted micropiles shall be installed using rotary drilling equipment. Percussion-type drilling equipment is not permitted without prior approval. Utilize same equipment for each production and test pile.

- C. Temporary casing to prevent caving during placement of reinforcement and grout may be required as determined by Geotechnical Engineer.
- D. Verify hole is open and clear for installation of steel reinforcement and grout.
- E. Hole diameter used for design of micropiles shall be determined by outside diameter of drill bit or coring shoe unless Contractor can verify that a larger diameter is developed by installation techniques.
- F. Excavation shall include removal of soil and other materials as required. Dispose of materials removed from holes off-site in accordance with applicable state and local regulations.
- G. Prior to installing reinforcing steel or grout, flush holes clean of drilling fluid and until contaminated water and cuttings are removed and a clean return is observed and accepted by Geotechnical Engineer.
- H. Install reinforcing steel or steel pipe as required by pile design at time of grout placement. Threaded splices may be used if permitted by Engineer. Use centralizers to position reinforcing steel or steel pipe within pile.
- I. Place grout by tremie method in accordance with PTI "Recommended Practice for Grouting of Post-Tensioned and Prestressed Concrete" as applicable.
- J. Place tremie pipe to bottom of pile. Maintain tremie pipe at least 5 feet below grout surface until casing is filled.
- K. Pressure-grout entire length of pile within bonded zone. Placement of grout shall occur during withdrawal of temporary casing if used.

### 3.3 TEST PILES

- A. Provide two compression test piles. Locations of test piles shall be coordinated by the Contractor and Owner.
- B. Test piles shall have same size and type as specified for other piling used for this project and installed in same manner.
  - 1. Test load shall be 200 percent of the design compressive capacity.
- C. Vibrating wire strain gauges to verify load transfer shall be provided by Contractor and installed on reinforcing steel in each test pile by Pile Contractor and inspected by Geotechnical Engineer. Strain gauges shall be installed at a minimum at the tip and mid-length. Provide calibration data and portable readouts for strain gauges.
- D. Accepted test piles may be used in work.

### 3.4 NON-CONFORMING PILES

- A. Non-conforming piles include piles that fail load tests, are installed out of tolerance, are below cut-off elevation, are damaged, or are not installed to specified bearing stratum.
- B. Provide additional piles or supplemental piles to meet project requirements at no additional cost to Owner. Enlarge pile caps as necessary to maintain minimum edge distance at no additional cost to Owner.

### 3.5 CLEAN - UP

- A. Remove from premises excavated material and other rubbish or debris resulting from work of this section.

### 3.6 TOLERANCES

- A. Variation in plan of a pile from the specified location in plan: plus or minus 2 inches.
- B. Variation in plan of centroid of pile group: plus or minus 2 inches.
- C. Variation in elevation at cut-off: plus or minus 2 inches.
- D. Variation from plumb or specified batter: plus or minus 1.5 percent.
- E. Centerline of core reinforcement shall not be more than 3/4 inch from centerline of pile.
- F. If the tolerances are exceeded, Contractor may enlarge size of an out-of-position or out-of-plumb hole and provide acceptable additional reinforcement so that above-grade portion of drilled pile may be constructed in true position and plumb, at no additional cost to Owner. Design deviations shall provide an installation equivalent to basic design.

**END OF SECTION 31 6333**

## **SECTION 32 1123**

### **AGGREGATE BASE COURSE**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Aggregate base courses for new pavements.

##### **1.02 RELATED SECTIONS**

- A. Section 31 2200 – Earthwork and Site Grading.
- B. Section 31 1100 – Aggregate materials and geotextiles.

##### **1.03 REFERENCES**

- A. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures.
- B. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- C. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- D. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.
- E. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- F. NYSDOT Standard Specifications (latest edition) section 203-3.12 compaction.

##### **1.04 SUBMITTALS**

- A. Contractor shall submit gradation and mechanical analysis for each aggregate sub-base material to be used.

##### **1.05 QUALITY ASSURANCE**

- A. Testing and Inspection Service: Contractor shall employ and pay for a qualified independent geotechnical testing and inspection service/laboratory to perform soil testing and inspection service during earthwork operations.
- B. Testing Laboratory Qualifications: To qualify for acceptance, the geotechnical testing and inspection service/ laboratory must demonstrate to Owner's Representative satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct required field and laboratory geotechnical testing without delaying the progress of the work.

#### **PART 2 PRODUCTS**

##### **2.01 MATERIALS**

- A. See Section 31 1100 – Aggregate materials, for Aggregate Subbase Course materials and geotextiles.

#### **PART 3 EXECUTION**

##### **3.01 EXAMINATION**

- A. Verify substrate has been inspected, gradients and elevations are correct, including crowns and cross sections, and is dry.

##### **3.02 PREPARATION**

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.



- B. Do not place fill on soft, muddy, or frozen surfaces.
- C. Proof-roll subgrade with a smooth drum roller (with vibratory capability with a minimum static drum weight of 10 tons. A minimum of 3 passes shall be made in one direction, followed by 3 overlapping passes in a direction perpendicular to the first.
- D. Install filtration and stabilization geotextiles in accordance with the plans and manufacturer's recommendation.

### **3.03 AGGREGATE PLACEMENT**

- A. Place aggregate sub-base on the prepared sub-grade in layers of uniform thickness, conforming to the cross-section and thickness indicated on the plans. Maintain the optimum moisture content for compacting the aggregate sub-base during placement operations.
- B. When a compacted aggregate sub-base course is shown to be 6" thick or more, place the material in equal layers, except no single layer more than 8" or less than 3" in thickness when compacted.
- C. Level and contour surfaces to elevations and gradients indicated. Place in such a manner to minimize segregation. No aggregate sub-base shall be placed under adverse weather conditions.
- D. Compact and roll each layer of aggregate sub-base course to 95% maximum density.
- E. All compaction requirements shall be in accordance with NYSDOT Standard Specification section 203-3.12. The depth of each sub-base course shall not exceed the compactor's capability. Each compactor lacking the original manufacturer identification plates, or with altered or illegible plates, will not be recognized as acceptable compaction equipment and shall be removed from the site.
- F. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- G. Use mechanical tamping equipment in areas inaccessible to compaction equipment.
- H. When the pavement sub-base becomes mixed with the sub-grade or any other material, it shall be removed and replaced with the appropriate material. The movement of any traffic over the fine graded aggregate sub-base is not recommended. When damage or contamination occurs, it must be repaired before paving begins.

### **3.04 TOLERANCES**

- A. Fine grading of the pavement sub-base finish course shall not vary more than 1/2 inch above or below true grade at any point.
- B. Scheduled Compacted Thickness: Within 1/4 inch.
- C. Flatness: Maximum variation of 1/2 inch measured with a 10 foot straight edge.

### **3.05 FIELD QUALITY CONTROL**

- A. Quality Control Testing during construction: Allow testing service to inspect, test and approve each aggregate sub-base layer before further backfill or construction work is performed. Testing service shall review and test material and determine optimum moisture at which maximum density can be obtained in accordance with ASTM D 1557, modified proctor.
- B. Field Compaction testing will be performed in accordance with ASTM D1556 (sand cone method), ASTM D2167 (rubber balloon method), or ASTM D2922 (nuclear method). If tests indicate work does not meet specified requirements, remove work, replace and re-test.
- C. Frequency of Tests: Make at least one field density test for each layer of aggregate sub-

base every 2,000 sq. ft.

**3.06 MAINTENANCE AND CLEAN-UP**

- A. Protection of graded areas: Protect newly graded and compacted aggregate sub-base courses from traffic and erosion. Repair and re-establish grades in settled, eroded and rutted areas.
- B. Remove all excess materials and debris from the Owner's property.

**END OF SECTION**

**SECTION 32 1316**  
**CONCRETE PAVEMENT**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Furnish and install concrete pavement.

**1.02 REFERENCES**

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).
- B. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.
- C. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 1988 (Reapproved 2002).
- D. ASTM A 185/A 185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2006.
- E. ASTM A 497/A 497M - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete; 2006.
- F. ASTM C 33 - Standard Specification for Concrete Aggregates; 2003.
- G. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2005.
- H. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete; 2007.
- I. ASTM C 150 - Standard Specification for Portland Cement; 2005.
- J. ASTM C 173/C 173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2001.
- K. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2006.
- L. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2006.
- M. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete; 2005a.
- N. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2005.
- O. ASTM C 685/C 685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2001.
- P. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (nonextruding and Resilient Bituminous Types); 2004.

**1.03 SUBMITTALS**

- A. Product Data: Provide data on concrete mix, joint filler, joint sealant, steel reinforcing, admixtures, and curing compound.
- B. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.

**1.04 QUALITY ASSURANCE**

- A. Perform work in accordance with ACI 301.
- B. Obtain cementitious materials from same source throughout.

- C. Follow recommendations of ACI 306R when concreting during cold weather.

## **1.05 ENVIRONMENTAL REQUIREMENTS**

- A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

## **PART 2 - PRODUCTS**

### **2.01 FORM MATERIALS**

- A. Form Materials: Conform to ACI 301.
- B. Wood form material, profiled to suit conditions.

### **2.02 JOINT FILLER**

- A. Preformed; non-extruding bituminous type (ASTM D 1751). Thickness: 3/8 inch, unless specified otherwise on the plans.
- B. Joint sealant: Two component polyurethane sealant: Polyurethane-based, two part elastomeric sealant, complying with FS TT-S-00227, Class A, type 1 (self leveling) unless type 2 (non-sag) is recommended by the manufacturer for application shown.

### **2.03 REINFORCEMENT**

- A. Steel Welded Wire Reinforcement: Plain type, ASTM A 185/A 185M; in flat sheets; unfinished.
- B. Dowels: ASTM A 615/A 615M Grade 40 (280); deformed billet steel bars; unfinished finish.

### **2.04 CONCRETE MATERIALS**

- A. Cement: ASTM C 150 Normal - Type I Portland type, grey color.
- B. Fine and Coarse Mix Aggregates: ASTM C 33.
- C. Fly Ash: ASTM C 618, Class C or F.
- D. Water: Clean, and not detrimental to concrete.
- E. Air Entrainment Admixture: ASTM C 260.
- F. Chemical Admixtures: ASTM C 494/C 494M, Type A - Water Reducing, Type C - Accelerating, and Type G - Water Reducing, High Range and Retarding.

### **2.05 ACCESSORIES**

- A. Curing Compound: ASTM C 309, Type 1, Class A.

### **2.06 CONCRETE MIX DESIGN**

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- C. Concrete Properties:
  - 1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: 4000 psi.
  - 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  - 3. Cement Content: Minimum 606 lbs. per cubic yard of concrete.
  - 4. Water-Cement Ratio: Maximum 40 percent by weight.
  - 5. Total Air Content: 4 percent, determined in accordance with ASTM C 173/C 173M.

6. Maximum Slump: 3 inches.
7. Maximum Aggregate Size: 1 inch.

## **2.07 MIXING**

- A. On Project Site: Mix in drum type batch mixer, complying with ASTM C 685. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
- B. Transit Mixers: Comply with ASTM C 94/C 94M.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify compacted sub-grade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

### **3.02 AGGREGATE SUB-BASE COURSE**

- A. See Section 32 1123 for construction of aggregate sub-base course for work of this Section.

### **3.03 PREPARATION**

- A. Moisten sub-base to minimize absorption of water from fresh concrete.
- B. Notify Owner's Representative minimum 24 hours prior to commencement of concreting operations.

### **3.04 FORMING**

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

### **3.05 REINFORCEMENT**

- A. Place reinforcement as indicated.
- B. Interrupt reinforcement at expansion joints.
- C. Place dowels to achieve pavement and curb alignment as detailed.

### **3.06 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304R.
- B. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- D. Place concrete to joint pattern.

### **3.07 JOINTS**

- A. Align curb and sidewalk joints.
- B. Place 3/8 inch wide expansion joints where shown on the plans and to separate paving from fixed vertical surfaces and other components and in pattern indicated.
  1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch off finished surface.
  2. Secure to resist movement by wet concrete.

3. Install joint sealant in accordance with manufacturer's recommendation.
- C. Provide scored joints:
  1. As shown on the plans and details.

### **3.08 FINISHING**

- A. Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius, and as shown on the plans.
- B. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

### **3.09 TOLERANCES**

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
- B. Maximum Variation From True Position: 1/4 inch.

### **3.10 FIELD QUALITY CONTROL**

- A. The Contractor shall employ an independent testing agency to perform field quality control tests and to submit test reports.
  1. Provide free access to concrete operations at project site and cooperate with appointed firm.
  2. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
  3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
- B. Compressive Strength Tests: ASTM C 39/C 39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.
  1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
  2. Perform one slump test for each set of test cylinders taken.
- C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

### **3.11 PROTECTION**

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

**END OF SECTION**

**SECTION 32 1318**  
**ASPHALT PAVEMENT**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Provide all labor, materials, tools, equipment, supervision and services necessary and incidental to install asphalt pavement as shown on the plans.

**1.02 RELATED SECTIONS**

- A. Section 31 1100 - Aggregate Materials
- B. Section 32 1322 – Painted Pavement Markings.

**1.03 REFERENCES**

- A. NYSDOT Standard Specifications (latest edition), Section 400 - Bituminous Pavements.
- B. ASTM D2950 - Density of Bituminous Concrete in Place by Nuclear Methods.
- C. ASTM D2041 - Specific Gravity and Density of Bituminous Paving Mixture, Theoretical Maximum.
- D. TAI - (The Asphalt Institute) - MS-2 Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.
- E. TAI - MS-8 Asphalt Paving Manual.

**1.04 SUBMITTALS**

- A. Test Reports: Submit the following reports to the Owner's Representative from the testing service, with a copy to the Contractor.
  - 1. One theoretical maximum density determination for each asphalt type.
  - 2. Field Reports; in-place density tests of asphalt pavement.
- B. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.
- C. Provide copies of NYSDOT certification of asphalt plant.

**1.05 QUALITY ASSURANCE**

- A. Perform Work in accordance with NYSDOT Standard Specifications (latest edition), Section 400 - Bituminous Pavements, and with local governing regulations if more stringent than herein specified.
- B. Existing survey markers, if disturbed, shall be reset by a licensed land surveyor at Contractor's expense. Grade stakes shall be placed to indicate edge of pavement grade. All stakes should be clearly marked and located at points of tangency, breaks in grade, low and high points and as directed by the Owner's Representative.
- C. Obtain materials from same source throughout.

**1.06 ENVIRONMENTAL REQUIREMENTS**

- A. Weather Limitations: Do not place asphalt pavement top course when ambient air or base surface temperature is less than 40 degrees F, or surface is wet. Asphalt binder course may be placed when ambient air or base surface temperature is above 30 degrees and rising and base is dry.
- B. Apply tack coat when ambient air or base surface temperature is above 50 degrees F for 12 hours immediately prior to application. Do not apply when base is wet.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. Asphalt Top Course: NYSDOT Standard Specifications section 400, Type 7, Item 402-096202.
- B. Asphalt Binder Course: NYSDOT Standard Specifications section 400, Type 3, Item 402.196202.
- C. Tack Coat: Homogeneous Asphalt Emulsion Tack Coat conforming to NYSDOT Material Designation 702-90.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify sub-base conditions under provisions of Section 31 2200 Earthwork and Site Grading.
- B. Verify that compacted sub-grade is dry and ready to support paving and imposed loads.
- C. Verify gradients and elevations of base are correct, including cross slope.

### **3.02 PLACING ASPHALT PAVEMENT**

- A. Place asphalt binder course on prepared surface, spread and strike-off. Spread mixture at a minimum temperature of 225 degrees F (107 degrees C). Place inaccessible and small areas by hand. Place each course to required grade, cross section and required compacted thickness. Place within 24 hours of applying a tack coat.
- B. Any irregularities in the surface of the pavement shall be corrected immediately. Excess materials forming high spots shall be removed. Indented areas shall be filled with hot mix and smoothed. Casting of mix over such areas will not be permitted.
- C. Make joints between old and new pavements and between successive days work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt pavement. Clean contact surfaces and apply tack coat.
- D. Prior to installing the top course, the binder course shall be cleaned, conditioned and leveled as specified in NYSDOT Standard Specification section 401-3.07. The Owner's Representative may require that a tack coat be applied to the binder course before the placement of the top course.
- E. Both courses shall be applied as specified in NYSDOT Standard Specification Section 401-3.05.

### **3.03 COMPACTION**

- A. Compact each course of asphalt placed in accordance with NYSDOT Standard Specification Section 401-3.12.
- B. Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphalt mix.
- C. Do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic.
- D. Any adjustment to existing driveways, shoulders and lawns required to meet the top course surface shall be done while, or immediately after the top course is placed.

### **3.04 TOLERANCES**

- A. Flatness: Maximum variation of ¼ inch measured with 10 foot straight edge.
- B. Scheduled Compacted Thickness: Within ¼ inch.



- C. Variation from True Elevation: Within ½ inch.

### **3.05 FIELD QUALITY CONTROL**

- A. Test in-place asphalt pavement for compliance with requirements for thickness and surface smoothness.
- B. Thickness Control: The Contractor shall furnish and pay the cost of 4" diameter diamond or shot drill cores of pavement taken at locations designated by the Owner's Representative. If the average thickness of any core so taken is 1/4" or more under the required thickness of the typical pavement section, the pavement is considered defective and additional cores shall be taken to determine the limit of defective pavement. The full extent of defective pavement so delineated shall be considered of no value to the Owner's Representative, and shall be carefully sawcut to a depth of 1" and fully removed and replaced to the specified thickness by the Contractor at no additional cost to the Owner's Representative. Repair and filling of cores with bituminous material as specified is to be performed by the Contractor and is considered incidental to the work.
- C. Surface Smoothness: Test finished surface of asphalt pavement for smoothness, using a 10' straightedge. Surfaces will not be acceptable if exceeding the specified tolerances for smoothness.
- D. All finished paved surfaces are to have sufficient pitch to convey water across the surface to a designated collection area.

### **3.06 CLEAN-UP**

- A. Clean-up and dispose of all surplus or waste material as a result of work of this section. Asphalt Pavement shall be broom cleaned and the surrounding area shall be cleaned of any loose asphalt mix.

### **3.07 PROTECTION**

- A. Immediately after placement, protect pavement from mechanical injury for 2 days, or until surface temperature is less than 140 degrees F.

**END OF SECTION**

## SECTION 32 1320

### STONE DUST WALK

#### PART 1 GENERAL

##### 1.01 SUMMARY

- A. The work shall consist of furnishing, placing and compacting crushed limestone in conformity with the lines, grades, thicknesses and typical sections shown on the Plans, or as determined by field conditions and ordered by the Owner's Representative.

#### PART 2 MATERIALS

- 2.01 MATERIALS Test and Control Methods.** The Department will perform materials tests and quality control methods pertaining to the work of this section in conformance with the procedures contained in the appropriate Departmental publications which are current on the date of advertisement for bids. These publications are available upon request to the NYSDOT, Geotechnical Engineering Bureau.

Material Requirements. Material shall consist of pulverized limestone. All materials furnished shall be well graded and free from unsuitable materials. All processing shall be completed at the source.

A. Gradation

Sieve Size Designation	Percent Passing by Weight
1 inch	100
3/4 inch	90-100
#4	30-55
#30	5-35
#200	2-9

- B. Soundness. Material will be accepted on the basis of a Magnesium Sulfate Soundness Loss after 4 cycles of 20 percent or less.
- C. Plasticity Index. The Plasticity Index of the material passing the #40 mesh sieve shall not exceed 5.0.
- D. Stockpiling. All material shall be stockpiled and sampled in accordance with the appropriate NYSDOT publication in effect on the date of the advertisement for bids. These publications are available upon request to the NYSDOT, Geotechnical Engineering Bureau.

#### PART 3 EXECUTION

##### 3.01 CONSTRUCTION DETAILS

The stone dust course shall be placed to grade with a paver. The Owner's Representative may waive this requirement, in writing, for locations where it is deemed not practical. In these situations, trucks shall be carefully unloaded on the grade at locations which minimize the distance the material must be moved. Uncontrolled spreading from piles dumped on grade will not be permitted.

Material shall be compacted in accordance with the requirements of *Compaction* of Section 203

Excavation and Embankment. A minimum of 95% of Standard Proctor Maximum Density will be required.

### **3.02 STONE DUST WALK**

Compaction of this course shall not lag spreading operations by more than 500 feet.

Should the subbase become mixed with the pulverized limestone course or any other material, the Contractor shall, at his expense, remove such mixture and replace it with approved materials.

The Contractor shall assume full responsibility for any contamination and degradation of any part of this course during construction and shall, at no cost to the State, remove any and all portions of this course which does not conform to the requirements of this specification and replace these portions with approved material.

After completion, the final surface of the course shall not extend more than 0.25 inch above nor more than 0.25 inch below true grade for the course at any location.

**END OF SECTION**

**SECTION 32 1322**  
**PAINTED PAVEMENT MARKINGS**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Furnish and install painted handicapped parking symbols and striping.
- B. Furnish and install crosswalk striping.

**1.02 REFERENCES**

- A. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, [www.paintinfo.com](http://www.paintinfo.com).
- B. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration; current edition at <http://mutcd.fhwa.dot.gov>.

**1.03 SUBMITTALS**

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- B. Certificates: Submit for each batch of paint, stating compliance with specified requirements.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver paint in containers of at least 5 gallons accompanied by batch certificate.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

**1.05 PROJECT CONDITIONS**

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Pavement Marking Paint: MPI No. 97 Latex Traffic Marking Paint, color: blue for handicap symbols and aisles. White for crosswalk striping.

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

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

**3.02 PREPARATION**

- A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving

the best result for the substrate under the project conditions.

- C. Clean surfaces thoroughly prior to installation.
  - 1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
- D. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.
- E. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.

### **3.03 INSTALLATION**

- A. Begin pavement marking as soon as practicable after surface has been cleaned and dried.
- B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F or more than 95 degrees F.
- C. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.
- D. Comply with FHWA MUTCD manual (<http://mutcd.fhwa.dot.gov>) for details not shown.
- E. Apply markings in locations determined by measurement from survey control points; preserve control points until after markings have been accepted.
- F. Apply uniformly painted markings of color(s), lengths, and widths as indicated on the drawings true, sharp edges and ends.
  - 1. Apply paint in one coat only.
  - 2. Wet Film Thickness: 0.015 inch, minimum.
  - 3. Length Tolerance: Plus or minus 3 inches.
  - 4. Width Tolerance: Plus or minus 1/8 inch.

### **3.04 DRYING, PROTECTION, AND REPLACEMENT**

- A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.
- B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.
- C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.
- D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.
- E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

### **END OF SECTION**

## **SECTION 32 1801**

### **ALUMINUM EDGING**

#### **PART 1 - GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Furnish and install aluminum edging for stone dust walk edging and landscape beds.

##### **1.02 SUBMITTALS**

- A. Product Data: Provide manufacturer's data and installation requirements for aluminum edging.

#### **PART 2 - PRODUCTS**

##### **2.01 MATERIALS**

- A. Aluminum Edging: 1/4" thick x 5" wide aluminum edging with slots for 15" long aluminum stakes. Painted Black finish.

#### **PART 3- EXECUTION**

##### **3.01 EXAMINATION**

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

##### **3.02 INSTALLATION**

- A. Install aluminum edging where indicated on the plans and in conformance with manufacturer's recommendations. Fasten in place with 15" tapered aluminum stakes driven through slots in the edging at 30" on center maximum spacing.

##### **3.03 FINISH**

- A. Provide two coats primer and one finish coat (color: black). Follow recommendations of paint manufacturer for application. Paint shall be applied evenly and worked well into joints and open spaces and shall be applied only to clean, dry surfaces.

##### **3.04 CLEAN-UP**

- A. Remove excess materials, leave area clean and neat.

**END OF SECTION**

**SECTION 32 1860**  
**SITE FURNISHINGS**

**PART 1 - GENERAL**

- 1.01 SECTION INCLUDES:** Furnish and provide all labor, material equipment and services necessary to complete the installation of site furnishings as indicated on the drawings and as specified herein. Provide materials, labor, equipment and services necessary to furnish, adapt and install all work of this section as shown on the Construction Documents and/or as required by job conditions, including, but not limited to the following:

- A. HC Signage
- B. Dry Stacked Stone Wall

**1.02 RELATED SECTIONS:**

- A. Section 03 3000 – Cast In Place Concrete

**1.03 SUBMITTALS**

- A. Provide shop drawings, manufacturer's product data and installation requirements for each type of site furnishing.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of site furnishing types and sizes required, whose products have been in satisfactory use in similar service for not less than five years.
- B. Installer's Qualifications: Firm with at least three years of successful installation experience on projects with furnishing work similar to that specified for project.

**PART 2 - PRODUCTS**

**2.01 TRAFFIC SIGNAGE**

- A. Panel: 0.80 mm thick aluminum sign panel. Sign face to be high density grade decals adhered with heat activated adhesive. Size, graphics and color as indicated on the plans and conforming to FHA Manual of Traffic Control Devices.
- B. Post: Galvanized and painted green steel flanged U-channel sign post weighing 4 lbs. per linear ft.

**2.02 DRY STACKED STONE WALL**

- A. Stone material shall be made of fractured limestone bedrock from local quarry, to the approximate shape and size as indicated on the drawings. Shape shall be roughly a flat rectangular, uniform shape with stone thickness approximately 6".

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that surfaces on which site furnishings are to be installed are level, smooth, clean, and otherwise ready to receive the work of this section. Do not proceed until unsatisfactory conditions are corrected.

**3.02 INSTALLATION**

- A. Install site furnishings where indicated on plans and as per manufacturer's instructions.

**3.03 PROTECTION**

- A. Protect all site furnishings from damage during construction. Repair or replace damaged

items at no additional cost to the Owner.

**3.04 CLEAN-UP**

- A. Remove excess materials, leave area in a clean and neat condition.

**END OF SECTION**



**SECTION 32 9218**  
**LANDSCAPE GRADING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This Section includes spreading topsoil and providing finish grade for final landscaping and seeding. Existing topsoil shall be stripped and stockpiled for reuse, import topsoil as required to meet project requirements.

**PART 2 – PRODUCTS**

**2.01 TOPSOIL**

- A. In accordance with Section 31 1000 – Soil Materials.

**2.02 SOURCE QUALITY CONTROL**

- A. Topsoil material shall consist of material complying with the specifications contained herein. Existing and re-used topsoil shall be tested and amended as necessary to comply with specifications.
- B. If testing and analysis indicate topsoil materials do not meet specified requirements, amend material and retest.
- C. Provide materials of each type from same source throughout the Work.

**PART 3 – EXECUTION**

- A. Verify earthwork and site grading has been completed and inspected.
- B. Verify sub-grade has been contoured and compacted.

**3.01 SUBGRADE PREPARATION**

- A. Eliminate uneven areas and low spots.
- B. Remove debris, roots, branches, stones, in excess of ½ inch in size. Remove subsoil contaminated with petroleum products.
- C. Scarify surface to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

**3.02 PLACING TOPSOIL**

- A. Place topsoil in areas where seeding and landscaping is required to a thickness of 4 inches or as indicated on the plans. Place topsoil during dry weather.
- B. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of sub-grade.
- C. Remove roots, weeds, rocks, and foreign material while spreading.
- D. Manually spread topsoil close to existing vegetation to prevent plant damage.
- E. Leave stockpile area and site clean and raked, ready to receive seeding.

**3.05 TOLERANCES**

- A. Top of Topsoil: Plus or minus ½ inch.

**3.06 PROTECTION**

- A. Protect landscaping and other features remaining as final work.

**3.07 CLEAN-UP**

- A. Remove all excess materials and debris from Owner's property.

**END OF SECTION**

## **SECTION 32 9219**

### **SEEDING**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. This Section includes the following:
  - 1. Soil preparation.
  - 2. Lawn seed mixture for permanent seeding, mulching, fertilizing and maintenance until final acceptance.
  - 3. Temporary seeding is specified in Section 31 2501 – Erosion and Sediment Control.

##### **1.02 DEFINITIONS**

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

##### **1.03 SUBMITTALS**

- A. Seed vendor's certified statement for each seed mixture required, stating botanical and common name, percentage by weight, percentages of purity, germination, weed seed for each grass seed species, and bagging date.
- B. Fertilizer and herbicide manufacturer's product and application data.

##### **1.04 QUALITY ASSURANCE**

- A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.
- B. Time of seeding: Sow lawn seed between April 1 and May 31 or September 1 and October 31, or as otherwise approved in writing by the Owner's Representative.

##### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver seed mixture in sealed containers showing seed vendor's name and seed analysis by weight. Seed in damaged packaging is not acceptable.
- B. Deliver fertilizer and herbicide in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- C. Store all products in a cool, dry and secure location.

#### **PART 2 – PRODUCTS**

##### **2.01 SEED MIXTURE**

- A. Provide fresh, clean, new-crop seed mixed in the proportions specified for species and variety, and conforming to state and federal standards.
- B. Acceptable material in a seed mixture other than pure live seed consists of nonviable seed, chaff, hulls, live seed of crop plants and inert matter. The percentage of weed seed shall not exceed 0.1% by weight.
- C. Lawn Seed Mixture:
  - Kentucky Bluegrass: 40 percent.
  - Palmer Perennial Ryegrass: 25 percent
  - Chewings Fescue: 35 percent.

## **2.02 SOIL MATERIALS**

- A. Topsoil: As specified in Section 31 1000 and in accordance with planting plans.

## **2.03 ACCESSORIES**

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B. Fertilizer: Complete fertilizer of neutral character, with some elements derived from organic sources and containing the following percentages of available plant nutrients: 1:2:1 ratio, 5% total nitrogen, 10% phosphoric acid, and 5% soluble potash.
- C. Herbicide: Apply a pre-emergent herbicide to the installed topsoil. Apply a post-emergent herbicide when weed infestation exceeds 5% of any planted lawn area. Reapply post-emergent herbicide application until weeds are eradicated.
- D. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of lawn or wildflowers.
- E. Tackifier: Natural Organic Bio-Degradable Tackifier. Tackifier shall consist of one primary hydrocolloid organic active ingredient which makes up at least 65% of the total formulation or a proven/approved inorganic equal. Tackifier shall be nontoxic and contain no germination or growth inhibiting factors. "Ecotak" as manufactured by Eastern Products, Inc. 1162 Sycamore Lane, Mahwah, NJ 07430, (201) 934-5050, or approved organic equal.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that prepared topsoil is true to grade, has been rolled and is ready to receive the work of this section. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

### **3.02 PRE-TREATMENT**

- A. After the areas required to be seeded have been brought to the required subgrade, apply pre-emergent herbicide per manufacturer's instructions. Remove debris and stones larger than 1/2 inch.

### **3.03 FERTILIZING**

- A. Apply fertilizer to lawn seed areas in accordance with manufacturer's instructions and according to soil test recommendations. More frequent applications at a lower rate are more desirable. Water all fertilizers after application.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

### **3.04 SEEDING**

- A. Apply seed at a rate of 6 lbs. per 1000 SF evenly in two intersecting directions in areas as indicated on the plans. Rake seed lightly into top 1/8 inch of soil.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- D. Roll seeded area with roller not exceeding 112 lbs.
- E. Immediately following seeding and compacting, apply mulch to a thickness of not less than 1" loose measurement. Maintain clear of shrubs and trees.

- F. Apply water with a fine spray immediately after each area has been mulched. Saturate the top 4 inches of soil. Apply tackifier in accordance with manufacturer's recommendations.

### **3.05 SEED PROTECTION**

- A. Identify seeded areas and take necessary precautions to minimize traffic in seeded areas.
- B. Protect seeded areas against erosion by spreading specified mulch after completion of seeding operations. Spread uniformly to form a continuous blanket not less than 1" loose measurement over seeded areas. Apply tackifier to securely hold in place the mulch. Apply a minimum ratio of 75 lbs. tackifier/2,000lbs. of mulch.

### **3.06 MAINTENANCE**

- A. Water to prevent seed and soil from drying out.
- B. Topdress surface to remove minor topsoil depressions or irregularities.
- C. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- D. Immediately re-seed areas which show bare spots.
- E. Protect seeded areas with warning signs during maintenance period.

### **3.07 CLEAN-UP**

- A. Remove all excess materials and debris from the owners property.

### **3.08 INSPECTION AND ACCEPTANCE**

- A. The Contractor is responsible for the establishment and proper care of a stand of grass over the entire seeded areas. Final acceptance of seeded areas will be granted when a uniform stand of grass is obtained. An acceptable stand of grass is one in which 98% coverage is obtained.
- B. A minimum maintenance period is required. The maintenance period shall extend until 98% coverage is obtained.

**END OF SECTION**

**SECTION 32 9220**  
**LANDSCAPE PLANTING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. This Section includes the following:
  - 1. Furnish and install new Landscape Plantings and Accessories.
  - 2. Furnish and install shredded bark mulch.
  - 3. Maintenance until final acceptance.

**1.02 DEFINITIONS**

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.
- B. Plants: Living trees, plants, and ground cover specified in this Section.

**1.03 SUBMITTALS**

- A. Submit list of plant sources, data for fertilizer and other amendments.
- B. Operation and Maintenance Data: include pruning objective, types and methods; types, application, frequency and recommended coverage of fertilizer.

**1.04 QUALITY ASSURANCE**

- A. Nursery Qualifications: Company specializing in growing and cultivating the plants with eight years documented experience.
- B. Installer Qualifications: Company specializing in installing and planting the plants with five years documented experience and approved by nursery.
- C. Maintenance Services: Performed by Installer.

**1.05 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer and herbicide composition.
- B. Plant Materials: Certified by state department of agriculture described by ASTM Z60.1; free of disease or hazardous insects.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect and maintain plant life until planted.
- B. Deliver plant life materials immediately prior to placement. Keep plants moist.
- C. Plant material which has been damaged by delivery, storage or handling will be rejected.

**1.07 ENVIRONMENTAL REQUIREMENTS**

- A. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.
- B. Do not install plant life when wind velocity exceeds 30 mph.

**1.08 WARRANTY**

- A. Warranty: Include coverage for one year beginning at Date of Substantial Completion. Replace dead or unhealthy plants as directed by Owner's Representative.
- B. Replacements: Plants of same size and species as specified, planted in the next growing

season, with a new warranty commencing on date of replacement.

## **PART 2 – PRODUCTS**

### **2.01 TREES AND SHRUBS**

- A. Planting Stock:
  - 1. All plants shall be true to type and name in accordance with the latest edition of Standardized Plant Names, official code of the American Joint Committee on Horticulture Nomenclature, and each bundle or each plant, when not tied in bundles, shall be labeled properly.
  - 2. All plants shall have a well-branched, vigorous and balanced root and top growth and, unless otherwise specified, shall be No. 1 Grade conforming to “American Standard for Nursery Stock” of the American Association of Nurserymen (AAN). They shall be free from disease, injurious insects, mechanical wounds, broken branches, decay or any other defect. Trees shall have reasonably straight trunks with well-balanced tops and a single leader. Deciduous plants, other than those specified as container grown, shall be dormant.
- B. Trees, Shrubs and Groundcovers: Species, size and variety identifiable in plant schedule shown on the plans, grown in climatic conditions similar to those in locality of the Work.
- C. Caliper trees up to 4 inches in caliper at a point 6 inches above the ground. Caliper trees 4 inches and over in caliper 12 inches above the ground.
- D. Supply trees which have been transplanted or root pruned in a uniform circle of 360 degrees about the root system at least once in interval of from one to three years prior to date of this contract.
- E. Provide balled and burlapped plants from soil that will hold a firm natural ball. Do not prune plants before delivery.

### **2.02 PLANTING SOIL MATERIALS**

- A. Planting Soil: The same material as Topsoil, as specified in Section 31 1000.

### **2.03 SOIL AMENDMENT MATERIALS**

- A. If soil tests indicate soil amendment, apply soil conditioners/fertilizers to amend soil to specified conditions.
- B. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight, pH range of 4 to 5; moisture content of 30 percent.
- C. Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of plants.

### **2.04 MULCH MATERIALS**

- A. Mulching Material: Shredded or ground hardwood bark mulch, free of growth or germination inhibiting ingredients and deleterious materials. Suitable for top dressing of trees and plant beds. Wood chips are not acceptable.

### **2.05 SOURCE QUALITY CONTROL AND TESTS**

- A. Provide testing and analysis of imported topsoil.
- B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt, organic matter and pH value.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that finish grades have been prepared and are ready to receive work.
- B. Percolation Test: Prior to planting, saturate plant pits with water to test drainage. Notify Owner's Representative of any drainage problems/concerns.

### **3.02 PREPARATION OF SUBSOIL**

- A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 3 inches (75 mm) where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
- D. Dig pits and beds 12 inches (300 mm) larger than plant root system.

### **3.03 PLACING TOPSOIL**

- A. Mix the following soil amendments with topsoil at the rates specified. Delay mixing of fertilizer if planting will not follow the placing of topsoil within a few days. 3.5 bushels of peat moss per cubic yard of topsoil and 1.25 lbs. of fertilizer per cubic yard of topsoil. inches (mm).
- B. Install amended topsoil intended for plant root balls, as specified on the plans.

### **3.04 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Lightly water to aid the dissipation of fertilizer.

### **3.05 PLANTING**

- A. Place plants for best appearance for review and final orientation by Saratoga Associates.
- B. Set plants vertical.
- C. Remove non-biodegradable root containers.
- D. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth of 6 inches (150 mm) under each plant. Remove burlap, ropes, and wires, from the root ball.
- E. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch (150 mm) layers. Maintain plant life in vertical position.
- F. Saturate soil with water when the pit or bed is half full of topsoil and again when full.

### **3.06 TREE PRUNING**

- A. Perform pruning of trees as recommended in ANSI A300.
- B. Prune newly planted trees as required to remove dead, broken, and split branches.

### **3.07 FIELD QUALITY CONTROL**

- A. When landscape work is completed, including maintenance, Owner's representative will make an inspection to determine acceptability. When inspected work does not comply with requirements, replace rejected work and continue specified maintenance until reinspected by Owner's representative and found to be acceptable. Remove rejected plants and materials promptly from the site.
- B. Plants will be rejected if a ball of earth surrounding roots has been disturbed or damaged prior to or during planting.
- C. End of Warranty Inspection: Remove and replace all dead, unhealthy or badly impaired plants according to original specification, if so directed by the Owner's representative. Replace planting during the next planting season if conclusion of warranty period is not within planting season.



### **3.08 MAINTENANCE**

- A. Furnish maintenance until end of one year warranty period.
- B. Irrigate sufficiently to saturate root system and prevent soil from drying out.
- C. Remove dead or broken branches and treat pruned areas or other wounds.
- D. Neatly trim plants where necessary.
- E. Immediately remove clippings after trimming.
- F. Water to prevent soil from drying out.
- G. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.
- H. Control insect damage and disease. Apply pesticides in accordance with manufacturers instructions.
- I. Remedy damage from use of herbicides and pesticides.
- J. Replace mulch when deteriorated.
- K. Maintain wrappings, guys, turnbuckles, and stakes. Adjust turnbuckles to keep guy wires tight. Repair or replace accessories when required.

**END OF SECTION**

**SECTION 33 1116**  
**SITE WATER DISTRIBUTION**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES:**

- A. Installation of site water pipe and appurtenances.
- B. Installation of Gate Valve and fittings.
- C. Connection to existing water line with tapping sleeve and valve and appropriate fittings where shown on the plans.
- D. Installation of concrete thrust blocks.

**1.2 REFERENCES:**

- A. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures (modified proctor).
- B. AWS A5.8 - Brazing Filler Metal.
- C. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
- D. AWWA C111- Rubber-Gasket Joints for Ductile Iron and Grey-Iron Pressure Pipe and Fittings.
- E. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
- F. AWWA C500 - Gate Valves, 3 through 48 in NPS, for Water and Sewage Systems.
- G. AWWA C509 – Resilient seated gate valves 3" – 12" NPS, for water and sewage systems.
- H. AWWA C550 – Fusion epoxy coated surfaces.
- I. AWWA C600 - Installation of Ductile-Iron Water Mains and Appurtenances.
- J. ASTM B88 – Seamless Copper water Tube.

**1.3 SUBMITTALS:**

- A. Product Data: Contractor shall submit manufacturer's technical product data and installation instructions for all hydrants, pipe materials, pipe fittings, valves and accessories.
- B. Record Drawings: At project closeout, contractor shall submit as-built drawings of installed water line and appurtenances. Record actual locations of piping, valves, connections and invert elevations.
- C. Manufacturer's Certificate: Contractor shall certify that all products of this section meet or exceed specified requirements.
- D. Contractor shall identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

#### **1.4 REGULATORY REQUIREMENTS:**

- A. Comply with all local and state water supply permits and/or approval requirements.
- B. Plumbing Code Compliance: Conform to applicable portions of the National Standard Plumbing Code and local codes pertaining to selection and installation of water supply system's materials and products.

#### **1.5 QUALITY ASSURANCE:**

- A. All materials and construction methods for work of this section shall comply with details and specifications set forth by the NYSDEC, NYSDOH, and the AWWA standards.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.

#### **1.6 DELIVERY, STORAGE, AND HANDLING:**

- A. Extreme care shall be taken in the handling of pipe and appurtenances. Under no circumstances shall such material be dropped, rolled or skidded against another pipe. All slings, hooks or pipe tongs shall be used in such a manner to prevent damage of the pipe. Handling pipe from the interior pipe wall is prohibited.
- B. Deliver and store valves in shipping containers with labeling in place.

### **PART 2 - PRODUCTS**

#### **2.1 WATER PIPE:**

- A. Ductile Iron Pipe: Class 52, double cement lined, with push on or mechanical type joints. North American continent made and meeting the requirements of AWWA C151.
- B. Fittings: Standard or compact ductile iron, cement lined.
- C. Mechanical Joints and Push On Joints: Rated for 350 psi working pressure.
- D. Mechanical Joints Restraints: Megalug series 1106 mechanical joint restraint for ductile iron pipe. Manufactured by EBAA Iron Sales, Inc. PO Box 857, Eastland, Texas 76448, phone 254-629-1731.
- E. Disinfection and sampling tap shall use ¾" Type K copper tubing, annealed, conforming to ASTM B88.

#### **2.2 VALVES:**

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Gate Valve:

The resilient wedge gate valves (3"-12") shall fully comply with the latest revision of AWWA C-509, and shall be UL Listed and FM approved. The valves shall be tested and certified to ANSI/NSF 61. The valve shall have a 250 psig working pressure. Each valve shall be factory seat tested to 250 psig and shell tested to 500 psig.

The valve shall have a non-rising stem. The stem shall be of bronze rolled stock and shall have a forged thrust collar. Cast stems are not acceptable. The valve shall have an arrow cast on the operating nut showing opening direction. The direction shall be OPEN LEFT (counter-clockwise).

The NRS valves shall be provided with a 2" square operating nut. The bolt that attaches the operating nut to the stem shall be recessed into the nut so as not to interfere with valve wrench operation. The design of the NRS valve stem shall be such that if excessive input torque is applied, stem failure shall occur above the stuffing box at such appoint as to enable the operation of the valve with a pipe wrench.

The NRS valves shall have a stuffing box that is o-ring sealed. Two o-rings shall be placed above and one o-ring below the thrust collar. The body and bonnet size shall also adhere to the minimum wall thickness s set forth in Table 2, section 4.3.1 of AWWA C-509. Reduced wall valves are not acceptable.

The valve disc and guide lugs must be fully (100%) encapsulated in rubber material. Guide caps of acetal bearing material shall be placed over solid guide lugs to prevent abrasion and to reduce operating torque. All valves shall have 304 stainless steel bolts and nuts for stuffing box and bonnet. The valves shall have internal and external ferrous surfaces coated with a fusion bonded thermosetting powder epoxy coating of 10 mils nominal thickness. The coating shall conform to AWWA C-550.

Hydrants shall be a three-way design, having one 4 ½" pumper connection and two 2 ½" hose nozzles(GA 8-306). The pumper connection and hose nozzles shall thread directly into the barrel and be field replaceable. The operating nut shall be a one piece design: 1 ½" pentagon in size and shape. The direction of opening shall be LEFT (counter-clockwise). The bonnet assembly shall be provided with n oil reservoir and lubrication system that automatically circulates lubricant to all stem threads and bearing surfaces each time the hydrant is operated.

## **2.4 MISCELLANEOUS ACCESSORIES:**

- A. Concrete for Thrust Restraints: As specified in the Specification Section 03 3000 and shown on the plan drawings.

## **2.5 PIPE BEDDING, HAUNCH AND FILL MATERIALS:**

- A. As specified in Section 31 1100 and as indicated on the drawings.

# **PART 3 – EXECUTION**

## **3.1 EXAMINATION**

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on the drawings.
- B. Verify that the municipal utility water main size, location, and invert are as indicated. Notify the Owner's Representative immediately if field conditions vary substantially from the Contract Documents.

## **3.2 PREPARATION:**

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

## **3.3 BEDDING:**

- A. Excavate pipe trench in accordance with Section 31 2200. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Form and place concrete for pipe thrust restraints at any change of pipe direction. Place concrete to permit full access to pipe and pipe accessories.

- C. Place pipe bedding at trench bottom, level fill materials in one continuous layer not exceeding the capability of the compaction equipment. Compact to 95% maximum density.
- D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact to 95 percent maximum density.
- E. Maintain suitable moisture content of bedding and backfill material to attain required compaction density.

### **3.4 INSTALLATION OF PIPE AND PIPE FITTINGS:**

- A. All water pipe shall have a minimum of 5' of cover.
- B. Maintain vertical and horizontal separation of water mains in accordance with the following:
  - 1. Horizontal separation - Whenever possible, water lines should be laid at least 10 Feet (edge to edge) from any existing or proposed sewer. Should local conditions prevent this lateral separation, a water line may be laid closer if;
    - a) It is in a separate trench.
    - b) It is laid in the same trench as the sewer and located on a bench of undisturbed earth. In either case, the elevation of the crown of the sewer is at least 18 inches below the bottom of the water main.
  - 2. Vertical separation - Whenever water lines must cross a sewer, the water line shall be laid at such an elevation that the outside of the sewer pipe is at least 18" from the outside of the water line. One full length of water line should be centered over the sewer so that both ends will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.
- C. All water lines and appurtenances shall be installed in a dry trench. Under no circumstances shall ground water be allowed to enter the water line. When construction is not in progress, the open ends of the pipe shall be closed by a watertight plug or cap.
- D. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- E. Install access fittings to permit disinfection of water system.
- F. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main.
- G. When using retainer glands, any joint deflection should be taken prior to tightening any bolt. Deflection at any joint shall not exceed 3 degrees.
- H. Backfill trench in accordance with Section 31 2200.

### **3.5 VALVES AND ACCESSORIES:**

- A. Install as per manufacturer's recommendations and in accordance with the plans.

### **3.6 CLEAN-UP:**

- A. Clean-up and remove all excess materials and debris as a result of work of this section, from the Owner's property.

**END OF SECTION**

## **SECTION 33 1300**

### **DISINFECTION OF WATER LINE**

#### **PART 1 - GENERAL**

##### **1.1 SECTION INCLUDES:**

- A. Disinfection and pressure testing of water distribution system.
- B. Testing and reporting results.

##### **1.2 REFERENCES:**

- A. AWWA (American Waterworks Association) B300 - Standard for Hypochlorites.
- B. AWWA (American Waterworks Association) B301 - Standard for Liquid Chlorine.
- C. AWWA (American Waterworks Association) B302 - Standard for Ammonium Sulfate.
- D. AWWA (American Waterworks Association) B303 - Standard for Sodium Chlorite.
- E. AWWA (American Waterworks Association) C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
- F. AWWA (American Waterworks Association) C651 - Standards for Disinfecting Water Mains.

##### **1.3 SUBMITTALS:**

- A. Test Reports: Indicate results comparative to specified requirements.
- B. Certificate: Certify that cleanliness of water distribution system meets or exceeds specified requirements.

##### **1.4 PROJECT RECORD DOCUMENTS:**

- A. Disinfection Report:
  - 1. Type and form of disinfectant used.
  - 2. Date and time of disinfectant injection start and time of completion.
  - 3. Test locations.
  - 4. Name of person collecting samples.
  - 5. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
  - 6. Date and time of flushing start and completion.
  - 7. Disinfectant residual after flushing in ppm for each outlet tested.
- B. Bacteriological Report:
  - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
  - 2. Time and date of water sample collection.
  - 3. Name of person collecting samples.
  - 4. Test locations.
  - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
  - 6. Coliform bacteria test results for each outlet tested.
  - 7. Certification that water conforms, or fails to conform, to bacterial standards of NYSDOH.

##### **1.5 QUALITY ASSURANCE:**

- A. Perform Work in accordance with AWWA C651.
- B. Maintain one copy of each document on site.
- C. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this section with minimum three years documented experience.
- D. Testing Firm: Company specializing in testing potable water systems, certified by the state of New York.
- E. Submit bacteriologist's signature and authority associated with testing.
- F. Coordinate inspections with Town of Kirkland and Owner's Representative.

## **PART 2 - PRODUCTS**

### **2.1 DISINFECTION CHEMICALS:**

- A. Chemicals: AWWA B300, Hypochlorite, AWWA B301, Liquid Chlorine, AWWA B302, Ammonium Sulfate, and AWWA B303, Sodium Chlorite.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION:**

- A. Verify that piping system has been cleaned, inspected, and pressure tested.
- B. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

### **3.2 EXECUTION:**

- A. Provide and attach required equipment to perform the Work of this section.
- B. Introduce treatment into piping system.
- C. Maintain disinfectant in system for 24 hours.
- D. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.
- E. Replace permanent system devices removed for disinfection.
- F. Pressure test system to 200 psi. Repair leaks and re-test as necessary.
  - 1. After completion of the pipeline installation, including backfill, but prior to final connection to the existing system, conduct, in the presence of the Owner's Representative, concurrent hydrostatic pressure and leakage tests in accordance with AWWA C600.
  - 2. Provide all equipment required to perform the leakage and hydrostatic pressure tests.
  - 3. The test pressure shall be not less than 200 psi, or 50 psi in excess of maximum static pressure, whichever is greater.
  - 4. The hydrostatic test shall be at least a two-hour duration.
  - 5. No pipeline installation will be approved if the pressure varies by more than 5 psi during the duration of the hydrostatic pressure test.
  - 6. Before applying the test pressure, air shall be expelled completely from the section of piping under test. Corporation cocks shall be installed so that the air can be expelled as the pipeline is being filled with water. After all the air has

been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the tests, the corporation cocks shall be removed and plugged.

7. Slowly bring the piping to the test pressure and allow the system to stabilize prior to conducting the leakage test. Valves shall not be operated in either the opening or closing direction at differential pressures above the rated pressure.
8. All exposed piping, fittings, valves, hydrants, and joints shall be examined carefully during the hydrostatic pressure test. Any damage or defective pipe, fittings, valves, hydrants, or joints that are discovered following the pressure test shall be repaired or replaced with sound material at no cost to the Owner, and test shall be repeated to the satisfaction of the Architect/Engineer.
9. No pipeline installation will be approved if the leakage is greater than that determined by the following formula:

$$L = \frac{SD(P)^{1/2}}{133,200}$$

L = the allowable, in gallons per hour

S = the length of pipe tested, in inches

D = the nominal diameter of the pipe, in inches

p = the average test pressure during the leakage test, in pounds per square inch (gauge)

10. If leakage exceeds the rate as determined in Paragraph 9 above, locate the source and make repairs as necessary to the satisfaction of the Owner's Representative.
11. The testing results shall be certified in writing to Hamilton College.

### 3.3 FIELD QUALITY CONTROL:

#### A. Disinfection, Flushing, and Sampling:

1. Disinfect the pipeline installation in accordance with AWWA C651, except that liquid chlorine shall not be used.
2. Upon completion of the retention period required for disinfection, flush the pipeline until the chlorine concentration of water leaving the pipeline is no higher than that generally prevailing in the existing system or is acceptable for domestic use.
3. Dispose of the chlorinated water in conformance with all Federal, State and Municipal laws, ordinances, rules, and regulations. If there is any possibility that the chlorinated discharge will cause damage to the environment, then a neutralizing chemical shall be applied to the chlorinated water to neutralize thoroughly the chlorine residual remaining in the water.
4. After final flushing and *before* the pipeline is connected to the existing system, or placed in service, the Contractor shall employ an NYSDOH approved independent testing laboratory to sample, test and certify the water for conformance with the purity standards of the NYSDOH, City of Amsterdam, the United States Environmental Protection Agency and the Federal Clean Water Act Health Standards. Laboratory results shall be forwarded to the NYSDOH District Office, the City of Amsterdam Engineering Department and the Owner's Representative. Approval must be granted from NYSDOH before the water system is put into operation by the City of Amsterdam Engineering Department.

**END OF SECTION**



**SECTION 33 3111**  
**SANITARY SEWER SYSTEM**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Furnish and install 2" sanitary sewer low pressure force main piping, fittings, and accessories.
- B. Furnish and install sanitary sewer cleanout.
- C. Connection to existing sanitary manhole.

**1.02 REFERENCES**

- A. ASTM D 1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2006.
- B. ASTM D 2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2003.
- C. ASTM D 3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2006.
- D. ASTM D 3212 - Standard Specification for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals.

**1.03 DEFINITIONS**

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

**1.04 SUBMITTALS**

- A. Product Data: Provide data indicating pipe, pipe accessories, and appurtenances.
- B. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Project Record Documents:
  - 1. Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.
  - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- E. Shop Drawings: Submit shop drawings for sanitary sewer manholes and pump station, showing all materials, pipe sizes, all rim and invert elevations, and any other pertinent information.

**1.05 REGULATORY REQUIREMENTS**

- A. Conform to applicable code for materials and installation of the Work of this section.

**1.06 PROJECT CONDITIONS**

- A. Coordinate the Work with termination of sanitary sewer connection outside building, connection to existing system and trenching.

**PART 2 - PRODUCTS**

**2.01 SEWER PIPE MATERIALS**

- A. Polyethylene Pipe (force main): 2" HDPE SDR 11 low pressure sanitary sewer pipe;

inside nominal diameter 2".

- B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required, bends, elbows, joints and other configurations required.
- C. Cleanouts: 4" dia., PVC SDR35 pipe with push on removable plug and cap. Molded or formed to suit configuration as shown on the plans.

### **PART 3 - EXECUTION**

#### **3.01 TRENCHING**

- A. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

#### **3.02 INSTALLATION – PIPE**

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.
- B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
  - 1. Plastic Pipe: Also comply with ASTM D 2321.
- C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

#### **3.03 INSTALLATION - CLEANOUTS**

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Establish elevations and pipe inverts for inlets and outlets as indicated.

#### **3.04 FIELD QUALITY CONTROL**

- A. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to the college.
- B. Pressure Test: Test in accordance with Recommended Standards for Wastewater Facilities (Ten States Standards), 1987 edition, sections 33.85, 33.95, and 34.7).
- C. Infiltration Test: Test in accordance with Recommended Standards for Wastewater Facilities (Ten States Standards), 1987 edition, sections 33.85, 33.95, and 34.7)].
- D. Deflection Test: Test in accordance with Recommended Standards for Wastewater Facilities (Ten States Standards), 1987 edition, sections 33.85, 33.95, and 34.7).]

#### **3.05 PROTECTION**

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

**END OF SECTION**

**SECTION 33 4111**  
**STORM WATER MANAGEMENT SYSTEM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Furnish and install storm drainage piping, fittings and accessories.
- B. Furnish and install area drains and drywells.
- C. Furnish and install underdrains.

**1.02 REFERENCES**

- A. AASHTO M294 – Specification for Corrugated Polyethylene Drainage Tubing, 4" Through 48" Diameters.
- B. ASTM A48 - Cast iron frames and grates.
- C. ASTM A615 - Steel bar reinforcement for pre-cast concrete catch basins.
- D. ASTM D1056 – Specification for Flexible Cellular Materials – Sponge or Expanded Rubber.
- E. ASTM D3350 - Standard Specifications for polyethylene plastic pipe and fittings.
- F. ASTM D2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- G. ASTM C150 - G-mat specification for pre-cast concrete catch basins and manholes.
- H. NYSDOT Standard Specifications (latest edition), Section 706-13 – Perforated Corrugated Polyethylene Underdrain Tubing.
- I. NYSDOT Standard Specifications (latest edition), Section 706-14 – Corrugated Polyethylene Storm Drain Pipe.

**1.03 SUBMITTALS FOR REVIEW**

- A. Product Data: Submit manufacturer's technical product data for all storm sewer pipe materials and fittings.
- B. Shop Drawings: Submit shop drawings for all area drains and underground sand filter, showing all materials, structure sizes, pipe sizes, all rim and invert elevations, and any other pertinent information.
- C. Record Drawings: At project closeout, submit as-built drawings of installed storm sewer system.

**1.04 REGULATORY REQUIREMENTS**

- A. Plumbing Code Compliance: Conform to applicable portions of the National Standard Plumbing Code pertaining to selection and installation of storm sewer system's materials and products.
- B. The Contractor and all subcontractors must comply with the terms of the SWPPP.

**1.05 COORDINATION**

- A. Coordinate work of this section with any and all other underground utility work.

## **1.06 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of storm sewer system's products of types, materials and sizes required, whose products have been in satisfactory use in similar service for not less than five years.
- B. Installer's Qualifications: Firm with at least three years of successful installation experience on projects with storm sewer work similar to that required for project.

## **PART 2 PRODUCTS**

### **2.01 PIPING AND ACCESSORIES**

- A. The prescribed sizes of pipe are nominal inside diameters. Pipes shall be of the size and lengths indicated on the plans.
- B. Storm Sewer Pipe (solid wall): Smooth Interior, Corrugated High Density Polyethylene Pipe and fittings (HDPE): Shall be high density, corrugated exterior, smooth interior polyethylene pipe in accordance with AASHTO M294 and section 706-14 of the NYSDOT Standard Specifications. Coupling bends shall cover at least one full corrugation on each section of pipe. Where watertight fittings are required, use pipes with molded couplings and "O" ring gaskets.
- C. Underdrain Pipe (4" perforated wall): Smooth Interior, Corrugated High Density Polyethylene Pipe and fittings (HDPE): Shall be high density, corrugated exterior, smooth interior polyethylene pipe in accordance with AASHTO M294 and section 706-14 of the NYSDOT Standard Specifications. Coupling bends shall cover at least one full corrugation on each section of pipe. Where watertight fittings are required, use pipes with molded couplings and "O" ring gaskets.

### **2.02 AREA DRAINS AND DRYWELL**

- A. Area Drains: Nyloplast 12" OR 18" (drywell), size drain basins with PVC body and cast iron frame and grates as indicated. Nyloplast as Manufactured by Advanced Drainage Systems (ADS), or approved equal.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate is ready to receive work and that the excavations, dimensions, and elevations are as indicated on the drawings.

### **3.02 PREPARATION**

- A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
- B. Remove large stones or other hard matter that could damage piping or impede consistent backfilling or compaction.

### **3.03 INSTALLATION OF PIPE AND PIPE FITTINGS**

- A. Install pipe, fittings, and accessories in accordance with governing authorities having jurisdiction, and manufacturer's instructions. Seal joints silt tight.
- B. Inspect piping before installation to detect apparent defects. Extreme care shall be taken in the handling of pipe and appurtenances. Under no circumstances shall such material be dropped, rolled or skidded against another pipe. All slings, hooks, and pipe tongs shall

be padded and used in such a manner to prevent damage to the pipe. Handling pipe from the interior pipe wall is prohibited. Mark defective materials with white paint and promptly remove from site.

- C. All pipe bedding, haunching and initial backfill materials shall have optimum moisture content suitable for proper compaction. Pipe haunch material shall be manually compacted and the initial backfill shall be mechanically compacted.
- D. Lay pipe beginning at low point of system, true to grades and alignment indicated, with unbroken continuity of invert. Contractor shall use a low intensity mobile laser for pipe alignment and grade. The laser must be set up to emit a beam of light through the pipe being installed. The use of a mechanical blower (designed for pipe lines) is required on all runs over 100' long. Using a level to check the elevation of the pipe at various locations is highly recommended. Maximum variation from true slope of 1/8 inch in 10 feet.
- E. Place bell ends or groove ends of piping facing upstream.
- F. Install initial backfill at sides and over top of pipe and compact. Provide final backfill in 6" lifts compacted to 95 percent maximum density.
- G. When required, install gaskets in accordance with manufacturer's recommendations including the use of lubricants, cements and other special installation requirements.
- H. Cleaning Pipe: Clear interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag line and pull past each joint as it is completed. In large, accessible piping, brushes and brooms may be used for cleaning.
- I. Place plugs in ends of uncompleted conduit at end of day or whenever work stops.
- J. Flush lines between drainage structures, if required, to remove collected debris.
- K. Interior Inspection: Inspect piping to determine whether line displacement or other damage has occurred.
  - 1. Make inspections after lines between drainage structures have been installed and approximately 2' of backfill is in place, and again at completion of project.
  - 2. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, correct such defects, and re-inspect.

### **3.04 INSTALLATION OF AREA DRAINS AND DRYWELLS**

- A. Form bottom of excavation clean and smooth to correct elevation. Install base aggregate to the depths and elevations indicated on the plans. Set drainage structures level and plumb and secure unto base aggregate.
- B. Establish rim and invert elevations for inlets and outlets as indicated.
- C. Mount lid and frame level onto pvc body to finish grade elevation.

### **3.05 TOLERANCES**

- A. Lay pipe to alignment and slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

### **3.06 BACKFILLING**

- A. Conduct backfill operations of open-cut trenches closely following laying, jointing and bedding of pipe, and after initial inspection and testing are completed.

- B. All piping and drainage structures shall be backfilled as per Section 31 2200.

### **3.07 FIELD QUALITY CONTROL**

- A. Notify the Owner's Representative 48 hours in advance of testing procedures. Provide all necessary testing apparatus. Prevent separation and displacement of piping during testing operation and take necessary safety precautions.
- B. Conduct all tests in the presence of the Owner's Representative or the authority/agency having jurisdiction, as may be required. All sections of piping that fail to pass the specified tests shall have the defects located and repaired or replaced and re-tested until passable, at the contractor's expense.
- C. Thoroughly clean and flush all sewers prior to testing. The following visual test is to be performed prior to final Acceptance: When shining a light at one end of a length of pipe, the full diameter must be visible from the other end, with no intermediate obstructions.
- D. The tests shall be performed prior to placement of pavement or other construction, which may, in the opinion of the Owner's Representative, be detrimentally affected by excavation required for repairs.
- E. The tests shall be performed only after the backfill has been in place and compacted to its full depth. Prior to testing, the contractor shall submit details of his testing procedures with a description of methods and equipment he proposes to use to the Owner's Representative for approval.
- F. If tests indicate Work does not meet specified requirements, remove Work, replace and re-test.

### **3.08 PROTECTION**

- A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

### **3.09 CLEAN-UP**

- A. Remove all excess materials and debris from work of this section.

**END OF SECTION**