

# PROJECT MANUAL

## Escalante 1 & 2 Wards HVAC Upgrade Escalante UT Stake

8 South Center Street  
Escalante, Utah 84726

**Project No. 503-8197-20010101**

**Project  
Engineer:** Van Boerum & Frank Associates, Inc  
Consulting Engineers  
181 East 5600 South  
Murray, Utah 84107  
Phone (801) 530-3148

Mechanical  
Engineer: VBFA (John Alexander)  
181 East 5600 South  
Murray, Utah 84107  
Phone (801) 530-3148

Electrical  
Engineer: VBFA (Lewis Wong)  
181 East 5600 South  
Murray, Utah 84107  
Phone (801) 530-3148

Architectural  
Consultant: Knell Architects (Roger Knell)  
45 East 300 North  
Provo, Utah 84606  
Phone (801) 373-6134

April 2021



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# INVITATION TO BID (U.S.)

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## 1. GENERAL CONTRACTORS INVITED TO BID THE PROJECT:

- a) Broderick & Henderson (801) 225 9213
- b) Dynamic Construction (801) 318 9711
- c) Majestic Builders (801) 798 2162
- d) Painter Building (801) 556 9794
- e) Oasis Builders (801) 466 1000
- f) Stone River Construction (801) 636 3217
- g) Warner & Associates Construction (801) 794 0024

## 2. PROJECT:

Escalante 1 & 2 Wards HVAC  
Escalante UT Stake  
Property Number: 503-8197  
Project Number: 503-8197-20010101

## 3. LOCATION:

8 South Center Street  
Escalante, Utah

## 4. OWNER:

Corporation of the Presiding Bishop of  
The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole  
c/o  
Corporation of the Presiding Bishop of  
The Church of Jesus Christ of Latter-day Saints, a Utah Corporation Sole  
c/o  
American Fork Project Management Office  
110 East Main Street  
American Fork, Utah 84003

## 5. CONSULTANT:

VBFA (John Alexander)  
181 East 5600 South  
Murray, Utah 84107  
Telephone (801) 530-31487  
jalexander@vbfa.com

## 6. DESCRIPTION OF PROJECT:

- A. Add four gas-fired furnace systems with supply and return air duct systems. Remove portions of steam heating piping at crawlspace at zones with new HVAC systems. Replace/add Danfoss controls and steam traps at convectors to remain. Upgrade building controls for all forced air systems to Honeywell LCBS system. Various Architectural remodeling including new mechanical rooms and areas of ceiling removal and replacement to accommodate HVAC upgrade.
- B. Products or systems may be provided under a Value Managed Relationship (VMR) the Owner has negotiated with the supplier. VMR products and systems are indicated as such in the Specifications.

7. **TYPE OF BID:** Bids will be on a lump-sum basis. Segregated bids will not be accepted.
8. **TIME OF SUBSTANTIAL COMPLETION:** The time limit for substantial completion of this work will be 120 calendar days and will be as noted in the Agreement.
9. **BID OPENING:** Bids to be submitted on the *ConsLog* website and will be publicly opened via a *ConsLog* video conference meeting on Thursday, May 20, 2021 at 2:00 PM MDT. Invitations to the *ConsLog* web conference shall be emailed to all invited contractors.
10. **BIDDING DOCUMENTS:**
  - A. Electronic copies of bidding documents will be available through *ConsLog* website to invited bidders who confirm their intention of providing project Bid.
  - B. Bidding Documents can also be provided at the Pre-Bid Conference if requested. Documents are to be returned complete and in good condition after bid opening.
11. **BID BOND:** Bid security in the amount of 5 percent (5%) of the bid will accompany each bid in accordance with the Instruction to Bidders.
12. **BIDDER'S QUALIFICATIONS:** Bidding by the General Contractors will be by invitation only.
13. **OWNER'S RIGHT TO REJECT BIDS:** The Owner reserves the right to reject any or all bids and to waive any irregularity therein.

END OF DOCUMENT

# INSTRUCTIONS TO BIDDERS (U.S.)

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## 1. DEFINITIONS:

- A. The definitions set forth in Section 1 of the General Conditions are applicable to the documents included under Bidding Requirements.
- B. Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The proposed Contract Documents consist of the documents identified as Contract Documents in the Form of Agreement, except for Modifications. The Bidding Requirements are those documents identified as such in the proposed Project Manual.
- C. Addenda are written or graphic documents issued by the Architect prior to execution of the Contract which modify or interpret the Bidding Documents. They become part of the Contract Documents as noted in the Form of Agreement upon execution of the Contract.

## 2. BIDDER'S REPRESENTATIONS:

- A. By submitting a bid, the bidder represents that
  - 1) Bidder has carefully studied and compared the Bidding Documents with each other. Bidder understands the Bidding Documents and the bid is fully in accordance with the requirements of those documents,
  - 2) Bidder has thoroughly examined the site and any building located thereon, has become familiar with local conditions which might directly or indirectly affect the contract work, and has correlated its personal observations with the requirements of the proposed Contract Documents, and
  - 3) Bid is based on the materials, equipment, and systems required by the Bidding Documents without exception.

## 3. BIDDING DOCUMENTS:

- A. Copies
  - 1) Bidding Documents may be obtained as set forth in the Invitation to Bid.
  - 2) Partial sets of Bidding Documents will not be issued.
  - 3) Bidders will use complete sets of Bidding Documents in preparing bids and make certain that those submitting sub-bids to them have access to all portions of the documents that pertain to the work covered by sub-bid, including General Conditions, Supplementary Conditions, and Division 01. Bidder assumes full responsibility for errors or misinterpretations resulting from use of partial sets of Bidding Documents by itself or any sub-bidder.
- B. Interpretation or Correction of Bidding Documents
  - 1) Bidders will request interpretation or correction of any apparent errors, discrepancies and omissions in the Bidding Documents.
  - 2) Corrections or changes to Bidding Documents will be made by written addenda.
- C. Substitutions and Equal Products
  - 1) Generally speaking, substitutions for specified products and systems, as defined in the Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
  - 2) The terms '*Acceptable Manufacturers*', '*Approved Manufacturers*', '*Suppliers*', '*Installers*' and '*VMR (Value Managed Relationship) Manufacturers / Suppliers / Installers*' are used throughout the Project Manual to differentiate among the options available to Contractor regarding specified products, manufacturers, and suppliers. See Section 016000 for options available regarding acceptance of equal products.
  - 3) Base bid only on materials, equipment, systems, suppliers or performance qualities specified in the Bidding Documents.

- 4) Architect is only authorized to consider requests for approval of equal products to replace specified products in Sections where the heading 'Acceptable Manufacturers' is used and statement, 'Equal as approved by Architect before bidding. See Section 016000' or 'Equal as approved by Architect before installation. See Section 016000,' appears. In Sections where the afore-mentioned statements do not appear and a different heading is used, Architect is authorized as Owner's representative to decline consideration of requests for approval of equal products. Approvals of equal products in such Sections must be made by Owner and will generally be for subsequent Projects.
- D. Addenda - Addenda will be sent to bidders and to locations where Bidding Documents are on file no later than one week prior to bid opening or by fax no later than 48 hours prior to bid opening.

#### 4. BIDDING PROCEDURES:

- A. Form and Style of Bids
- 1) Owner's Bid Form is for reference only. Official bid must be submitted through *ConsLog*.
  - 2) Bid will be complete and executed by authorized representative of Bidder.
  - 3) Do not delete from or add to the information requested on bid form.
- B. Bid Security
- 1) Each bid will be accompanied by a bid bond naming Owner, as listed in the Agreement, as obligee. If Bidder refuses to enter into a Contract or fails to provide bonds and insurance required by the General Conditions, amount of bid security will be forfeited to Owner as liquidated damages, not as a penalty.
  - 2) Bid bond will be issued by a surety company meeting requirements of the General Conditions for surety companies providing bonds and will be submitted on AIA Document A310, Bid Bond or AIA authorized equivalent provided by surety company. The attorney-in-fact who executes the bond on behalf of the surety will affix to the bond a certified and current copy of the power of attorney.
  - 3) Owner may retain bid security of bidders to whom an award is being considered until -
    - a. Contract has been executed and bonds have been furnished,
    - b. Specified time has elapsed so bids may be withdrawn, or
    - c. All bids have been rejected.
- C. Submission of Bids
- 1) Bids to be submitted on the *ConsLog* website and will be publicly opened via a *ConsLog* video conference meeting.
  - 2) It is bidder's sole responsibility to see that its bid is received at specified time. Bids received after specified bid opening time will be returned to bidders unopened.
  - 3) No oral, facsimile transmitted, telegraphic, or telephonic bids, modifications, or cancellations will be considered.
- D. Modification or Withdrawal of Bid
- 1) Bidder guarantees there will be no revisions or withdrawal of bid amount for 45 days after bid opening.
  - 2) Prior to bid opening, bidders may withdraw bid through *ConsLog*.
  - 3) Prior to bid opening, bidder may acknowledge any or all Addenda through *ConsLog*.

#### 5. CONSIDERATION OF BIDS:

- A. Opening of Bids - See Invitation to Bid.
- B. Rejection of Bids - Owner reserves right to reject any or all bids and to waive any irregularity therein.
- C. Acceptance of Bid
- 1) No bidder will consider itself under contract after opening and reading of bids until Agreement between Owner and Contractor is fully executed.



- 2) Bidder's past performance, organization, subcontractor selection, equipment, and ability to perform and complete its contract in manner and within time specified, together with amount of bid, will be elements considered in award of contract.

**6. POST-BID INFORMATION:**

- A. The conditionally accepted bidder submitting a bid involving subcontractors will submit its list of proposed subcontractors in a meeting to be held immediately after bid opening.

**7. PERFORMANCE BOND AND PAYMENT BOND:**

- A. Bond Requirements - Performance Bond and Labor and Material Payment bond will be required for this Project as specified in the General Conditions.
- B. Time of Delivery of Bonds - Bonds will be delivered to Owner with Agreement signed by bidder.

**8. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR:**

- A. Agreement form will be "Agreement Between Owner and Contractor for a Fixed Sum (U.S.)" provided by Owner.

**9. MISCELLANEOUS:**

- A. Pre-Bid Conference
  - 1) A pre-bid conference will be held at the site (8 South Center Street, Escalante, Utah) on Thursday, May 6, 2021 at 11:00 AM.
- B. Liquidated Damages - Conditions governing liquidated damages are specified in the General Conditions and in the Supplementary Conditions.
- C. Examination Schedule for Existing Building and Site
  - 1) Contact local FM group for access to building between Pre-Bid Conference and Bid Date. Cedar City UT FM Group, Michael Rice, (801) 420-3713.
- D. Exemption from local taxes - See Supplementary Conditions

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# INFORMATION AVAILABLE TO BIDDERS (U.S.)

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## 1. ASBESTOS-CONTAINING MATERIAL (ACM)

- A. The building upon which work is being performed has been examined for asbestos-containing material. There is no known ACM in the area of construction. If the Contractor encounters material that is suspected to be ACM, the Contractor shall immediately discontinue work and contact the Owner and Architect immediately.

END OF DOCUMENT

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## SUBCONTRACTORS AND MAJOR MATERIALS SUPPLIERS LIST

Project Name: \_\_\_\_\_ Date: \_\_\_\_\_

Stake: \_\_\_\_\_ Project No: \_\_\_\_\_

General Contractor: \_\_\_\_\_

General Contractor is to provide the names of the following subcontractors and suppliers to the Owner's Project Manager immediately following the bid opening:

### VMR SUBCONTRACTORS

Roofing \_\_\_\_\_

Doors, Frames & Hardware \_\_\_\_\_

Storefronts \_\_\_\_\_

Wood Flooring \_\_\_\_\_

Other \_\_\_\_\_

Other \_\_\_\_\_

### SUBCONTRACTORS AND SUPPLIERS

Grading / Site work \_\_\_\_\_

Site Utilities \_\_\_\_\_

Demolition \_\_\_\_\_

Paving \_\_\_\_\_

Termite Control \_\_\_\_\_

Site Concrete \_\_\_\_\_

Fencing \_\_\_\_\_

Irrigation System \_\_\_\_\_

Landscaping \_\_\_\_\_

Building Concrete \_\_\_\_\_

Masonry \_\_\_\_\_

Structural Steel \_\_\_\_\_

Framing \_\_\_\_\_

Trusses \_\_\_\_\_

Insulation \_\_\_\_\_

EIFS \_\_\_\_\_

Soffit / Fascia \_\_\_\_\_

Steeple \_\_\_\_\_

Millwork \_\_\_\_\_

Drywall \_\_\_\_\_

Ceramic Tile \_\_\_\_\_

Acoustical Tile \_\_\_\_\_

Painting \_\_\_\_\_

Wall Coverings \_\_\_\_\_

Elevators / Lifts \_\_\_\_\_

Draperies \_\_\_\_\_

Fire Sprinklers \_\_\_\_\_

Plumbing \_\_\_\_\_

HVAC \_\_\_\_\_

Electrical \_\_\_\_\_

Controls \_\_\_\_\_

Sound / Satellite \_\_\_\_\_

# EQUAL PRODUCT APPROVAL REQUEST FORM (U.S.)

---

Project Name: \_\_\_\_\_ Request Number: \_\_\_\_\_

TO: \_\_\_\_\_

FROM: \_\_\_\_\_

BID DATE: \_\_\_\_\_

---

A proposed product is not legally approved and cannot legally be included in a bid or used in the Work until it appears in an Addendum or other Contract Modification as defined in the General Conditions. See Instructions To Bidders Paragraph 3.C, General Conditions, and Section 016000.

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## PROPOSED EQUAL PRODUCT:

Specification Section: \_\_\_\_\_

Specified Products: \_\_\_\_\_

Proposed Product: \_\_\_\_\_

The Undersigned certifies:

1. Proposed equal product has been fully investigated and determined to be equal or superior in all respects to specified products.
2. Same warranty will be furnished for proposed equal product as for specified products.
3. Same maintenance service and source of replacement parts, as applicable, is available.
4. Proposed equal product will have no adverse effect on other trades and will not affect or delay progress schedule.
5. Proposed equal product does not affect dimensions and functional clearances.

## ATTACHMENTS:

Include the following attachments -

1. Copy of the Project Manual Section where the proposed equal product would be specified, rewritten or red-lined to include any changes necessary to correctly specify the proposed equal product. Identify completely changes necessary to the original Project Manual Section.
2. Copies of details, elevations, cross-sections, and other elements of the Project Drawings redone as necessary to show changes necessary to accommodate proposed equal product. Identify completely the changes from the original Drawings.
3. Complete product literature and technical data, installation and maintenance instructions, test results, and other information required to show complete conformance with requirements of the Contract Documents.

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

Printed Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

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

Telephone \_\_\_\_\_ Fax \_\_\_\_\_

**REVIEW COMMENTS:**

\_\_\_\_\_ Accepted. See Addenda Number \_\_\_\_\_.

\_\_\_\_\_ Submission not in compliance with instructions. Respond to attached comments and resubmit.

\_\_\_\_\_ Proposed equal product not acceptable. Use specified products.

\_\_\_\_\_ Not Reviewed. Submission received too late. Use specified products.

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**ADDITIONAL COMMENTS:**

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**BY:** \_\_\_\_\_ **DATE:** \_\_\_\_\_



# BID FORM (for reference only)

FOR GENERAL CONTRACT WORK (U.S.)

## PROJECT IDENTIFICATION:

Escalante 1 & 2 Wards HVAC Upgrade  
Escalante UT Stake  
Project Number: 503-8197-20010101

## OWNER:

Corporation of the Presiding Bishop of the Church of Jesus Christ of Latter-day Saints, a Utah corporation  
sole ("Owner")  
American Fork Project Management Office  
110 East Main Street  
American Fork, Utah 84003

## CONSULTANT:

Van Boerum & Frank Associates, Inc

## BID

1. In submitting this Bid, Bidder represents that:
  - a. If this Bid is accepted, Bidder will enter into an agreement with Owner to perform and furnish the Work described in the Bidding Documents for the Bid Price and within the Time of Substantial Completion indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
  - b. Bidder has carefully examined Set(s) Number \_\_\_\_\_ of the Bidding Documents consisting of the Project Manual containing the Bidding Requirements, the Conditions of the Contract, and the Specifications, entitled \_\_\_\_\_, the Drawings entitled \_\_\_\_\_ and dated \_\_\_\_\_, and including sheets numbered \_\_\_\_\_, and addenda numbers \_\_\_\_\_.
  - c. Bidder has examined the site of the work, existing conditions, and all other conditions affecting the work on the above-named Project.
  - d. Bidder has carefully correlated the information known to Bidder and information and observations obtained from visits to the site with the Bidding Documents.
  - e. Bidder is familiar with federal, State, and local laws and regulations applicable to Project.
  - f. Bidder guarantees there will be no revisions or withdrawal of bid amount for forty-five (45) days after the bid opening.
2. Bidder hereby proposes to furnish all materials, labor, equipment, tools, transportations, services, licenses, fees, permits, etc., required by said documents to complete the Work described by the Contract Documents for the lump-sum of: \_\_\_\_\_ Dollars (\$ \_\_\_\_\_).
3. Bidder agrees to achieve substantial completion of the Work within the number of days indicated in the Invitation to Bid.
4. Enclosed is a Bid Bond for not less than five percent (5%) of the bid.

RESPECTFULLY SUBMITTED:

_____	Signature	
_____	Printed name	
_____	Title	
_____	Company name	
_____	Business Address	
_____	City, State, and Zip Code	
_____	Telephone	Fax
_____	Contact Email Address	

Date \_\_\_\_\_

License No. \_\_\_\_\_

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# CONSTRUCTION MATERIAL ASBESTOS STATEMENT (U.S.)

## PROJECTS FOR: CORPORATION OF THE PRESIDING BISHOP OF THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS

Building Name: Escalante 1 & 2 Wards

Building Plan Type: Undefined

Building Address: 8 South Center Street, Escalante, Utah

Building Owner: Corporation of the Presiding Bishop of The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole.

Project Number: 503-8197-20010101

Completion Date:

As PROJECT CONSULTANT and principal in charge; based on my best knowledge, information, inspection, and belief; I certify that on the above referenced Project, no asbestos-containing building materials were specified in the construction documents or given approval in shop drawings or submittals.

Project Consultant and Principal in Charge (signature)

Date

VBFA, Inc.

Company Name

As GENERAL CONTRACTOR in charge of construction; based on my best knowledge, information, inspection, and belief; I affirm that on the above-referenced Project, no asbestos-containing building materials were used in the construction.

General Contractor (signature)

Date

Company Name



# AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR A FIXED SUM (U.S.)

Corporation of the Presiding Bishop of The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole, ("Owner") and \_\_\_\_\_ ("Contractor") hereby enter into this Agreement Between Owner and Contractor for a Fixed Sum (U.S.) ("Agreement") and agree as follows:

1. **Property/Project.**

Property/Project Number:	503819720010101
Property Address ("Project Site"):	8 South Center Street, Escalante, UT 84726
Project Type:	HVAC, Upgrade R & I
Project Name ("Project"):	Escalante 1 & 2 Wards
Stake Name:	Escalante, UT

2. **Scope of the Work.** Contractor will furnish all labor, materials, equipment, construction, and services necessary to complete the Work in accordance with the Contract Documents.

3. **Contract Documents.**

a. The Contract Documents consist of:

- 1) This Agreement;
- 2) The General Conditions for a Fixed Sum (U.S.), the Supplementary Conditions for a Fixed Sum (U.S.), and the Specifications (Divisions 01 through 49) contained in the Project Manual entitled \_\_\_\_\_, dated \_\_\_\_\_ and prepared by \_\_\_\_\_ ("Architect");
- 3) The Drawings prepared by Architect entitled \_\_\_\_\_, sheet numbers \_\_\_\_\_, dated \_\_\_\_\_;
- 4) Addendum No. \_\_\_\_\_ dated \_\_\_\_\_; and
- 5) All Modifications to the Contract Documents.

b. The Contract Documents are incorporated into this Agreement by reference as if fully set forth herein.

c. The definitions set forth in the General Conditions for a Fixed Sum (U.S.) will apply to the Contract Documents.

d. The Contract Documents contain the entire and integrated agreement between the parties hereto and supersede all prior negotiations, representations, or agreements, either written or oral.

e. Modifications or other amendments to the Contract Documents must be in writing and as provided in the General Conditions for a Fixed Sum (U.S.).

4. **Time of Commencement and Substantial Completion.**

a. Contractor will commence the Work on the date for commencement set forth in the Written Notice to proceed from Owner to Contractor.

b. Contractor will achieve Substantial Completion and have the Work ready for Owner's inspection no later than \_\_\_\_\_ (\_\_\_\_\_) days from the date of commencement set forth in the Written Notice to proceed from Owner to Contractor, as adjusted in accordance with the Contract Documents.

c. Time is of the essence.

5. **Contract Sum.**

a. Owner will pay Contractor for performance of Contractor's obligations under the Contract Documents the Contract Sum in the amount of \_\_\_\_\_ Dollars (\$\_\_\_\_\_), subject to additions and deductions as provided in the Contract Documents.

b. Owner will make payments to Contractor in accordance with the Contract Documents.

6. **Independent Contractor Relationship.** Contractor is an independent contractor and is not the agent or employee of Owner.

7. **Assignment.** Neither party to this Agreement will assign any right or obligation hereunder without the prior written consent of the other, which consent may be granted or withheld in such party's absolute discretion. Contractor will not assign moneys due or to become due to Contractor hereunder, nor will Contractor pledge the credit of Owner or bind Owner to any third party.

8. **Notice.** The parties designate the addresses, facsimile numbers, and email addresses as set forth in the signature blocks below to be used for sending Written Notice to the other party:

9. **Effective Date.** The effective date of this Agreement is the date indicated by the Owner's signature.

**OWNER:**

Corporation of the Presiding Bishop of  
The Church of Jesus Christ of Latter-day Saints,  
a Utah corporation sole.

**CONTRACTOR:**

(company)

Signature:

Signature:

Print Name:

Print Name:

Title:

Title:

Address:

Address:

Telephone No:

Telephone No:

Facsimile No:

Facsimile No:

Email:

Email:

Effective Date:

Fed. I.D. or SSN:

License No:

Reviewed By:

Date Signed:

# GENERAL CONDITIONS

## For a Fixed Sum (U.S.)

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### SECTION 1 - GENERAL PROVISIONS

#### 1.1 DEFINITIONS

- A. Adverse Weather: weather conditions that are seasonally abnormal and could not have been reasonably anticipated.
- B. Agreement: the document entitled "Agreement Between Owner and Contractor for a Fixed Sum (U.S.), executed by Owner and Contractor for performance of the Work.
- C. Architect: the entity identified as such in the Agreement.
- D. Change In The Work: a modification to the requirements of the Contract Documents or a delay in Substantial Completion resulting from an instruction from Owner or Architect to Contractor or from another event or circumstance.
- E. Change Order: a written instrument prepared by Architect and signed by Owner, Contractor, and Architect stating their agreement upon the following: (1) the occurrence of a Change in the Work; (2) the amount of the adjustment, if any, in the Contract Sum as a result of the Change in the Work; and (3) the extent of the adjustment, if any, in the Contract Time as a result of the Change in the Work.
- F. Construction Change Directive: a written order prepared by Architect and signed by Architect and Owner which: (1) orders a Change in the Work if the terms of a Change Order cannot be agreed upon prior to performance of a Change in the Work described in Section 7.1 or after occurrence of an event or circumstance described in Section 7.2; and (2) states a proposed basis for adjustment, if any, in the Contract Sum, the Contract Time, or both, resulting from the Change in the Work.
- G. Contract Documents: the documents identified as such in the Agreement.
- H. Contract Sum: the total amount set forth in the Agreement payable by Owner to Contractor for performance of the Work.
- I. Contract Time: the period of time set forth in the Agreement for the Substantial Completion of the Work.
- J. Contractor: the entity identified as such in the Agreement.
- K. Day: calendar day unless otherwise specifically defined.
- L. Direct Costs: actual costs for labor, materials, equipment, insurance, bonds, subcontract costs and onsite supervision relating to the Project. They do not include labor costs for project managers or other off-site administration.
- M. Drawings: the documents identified as such in the Agreement.
- N. Field Change: a written order prepared by Architect and signed by Architect and Contractor for a minor Change in the Work consistent with the general intent of the Contract Documents costing \$1,000 or less, resulting in no time extension, and which is necessary to avoid delaying the Work.
- O. Modification: a written amendment to the Contract Documents in the form of a:
  - 1. Change Order;
  - 2. Construction Change Directive; or
  - 3. Field Change.
- P. Owner: the entity identified as such in the Agreement.
- Q. Project: the total construction designed by Architect of which the Work performed under the Contract Documents may be the whole or a part.

- R. Product Data: standard illustrations, schedules, performance charts, instructions, brochures, diagrams, and other information furnished by Contractor to illustrate details regarding materials or equipment to be used in the Work, or the manner of installation, operation, or maintenance of such materials or equipment.
- S. Project Manual: the document identified as such in the Agreement.
- T. Samples And Mock-ups: physical examples that illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.
- U. Shop Drawings: drawings, diagrams, illustrations, schedules, performance charts, fabrication and installation drawings, setting diagrams, patterns, templates, and other data which illustrate some portion of the Work and confirm dimensions and conformance to the Contract Documents specially prepared by Contractor or any Subcontractor, manufacturer, supplier, or distributor.
- V. Specifications: the documents identified as such in the Agreement.
- W. Subcontractor: any entity supplying labor, materials, equipment, construction or services for the Work under separate contract with Contractor or any other Subcontractor.
- X. Submittals: Shop Drawings, Product Data, Samples and Mock-ups and any other documents or items furnished by Contractor or its Subcontractors to Owner or Architect to demonstrate how any portion of the Work will be accomplished or the type of materials or products that will be used in the Work.
- Y. Substantial Completion: Completion of the Work to a point where Owner can use the Work for its intended purposes. The date of Substantial Completion is the date certified as such by Architect in accordance with the Contract Documents.
- Z. Work: all labor, materials, equipment, construction, and services required by the Contract Documents.
- AA. Written Notice: notice in writing given from one party to the other at the addresses or facsimile numbers listed in the Agreement, or at such other addresses or facsimile numbers as the parties will designate from time to time by Written Notice, and will be effective at the earliest of:
  1. The date of personal delivery to the other party with signed acknowledgment of receipt; or
  2. The date sent by facsimile transmission to the other party provided receipt of the facsimile is verified by an electronic confirmation report by the party sending the facsimile transmission and further provided that a confirmation copy is sent to the other party by courier or by registered or certified mail within twenty-four (24) hours after the time and date of the facsimile transmission; or
  3. The date of receipt by the other party as stated on the return receipt if sent by registered or certified mail, or by courier.

## 1.2 CORRELATION AND INTENT OF CONTRACT DOCUMENTS

- A. The intent of the Contract Documents is to require Contractor to provide all labor, materials, equipment, construction, and services necessary for the proper execution and completion of the Work. The Contract Documents are complementary and what is required by any one will be as binding as if required by all. Contractor will perform the Work in accordance with the requirements expressly set forth in or reasonably inferable from the Contract Documents.
- B. The organization of the Contract Documents is not intended to control Contractor in dividing the Work among Subcontractors or to establish the extent of the Work to be performed by any trade.
- C. Words used in the Contract Documents that have well known technical or trade meanings are used therein in accordance with such recognized meanings.
- D. In the interest of brevity, the Contract Documents may 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.

## 1.3 OWNERSHIP AND USE OF CONTRACT DOCUMENTS

The Drawings, the Project Manual, and copies thereof are the property of Owner. Contractor will not use these documents on any other project. Contractor may retain one copy of the Drawings and the Project Manual as a contract record set and will return or destroy all remaining copies following final completion of the Work.

## 1.4 PUBLIC STATEMENTS REGARDING PROJECT

Contractor will not make any statements or provide any information to the media about the Project without the prior written consent of Owner. If Contractor receives any requests for information from media, Contractor will refer such requests to Owner.

## 1.5 OWNERSHIP AND USE OF RENDERINGS AND PHOTOGRAPHS

Renderings representing the Work are the property of Owner. All photographs of the Work, whether taken during performance of the Work or at completion, are the property of the Owner. The Owner reserves all rights including copyrights to renderings and photographs of the Work. No renderings or photographs shall be used or distributed without written consent of the Owner.



## **1.6 NO COMMERCIAL USE OF TRANSACTION OR RELATIONSHIP**

Without the prior written consent of Owner, which Owner may grant or withhold in its sole discretion, neither Contractor nor Contractor's affiliates, officers, directors, agents, representatives, shareholders, members, Subcontractors, Sub-subcontractors or employees shall make any private commercial use of their relationship to Owner or the Project, including, without limitation:

- A. By referring to this Agreement, Owner, or the Project verbally or in any sales, marketing or other literature, letters, client lists, press releases, brochures or other written materials except as may be necessary for Contractor to perform Contractor's obligations under the terms of this Agreement;
- B. By using or allowing the use of any photographs of the Project or any part thereof, or of any service marks, trademarks or trade names or other intellectual property now or which may hereafter be associated with, owned by or licensed by Owner in connection with any service or product; or
- C. By contracting with or receiving money or anything of value from any person or commercial entity to facilitate such person or entity obtaining any type of commercial identification, advertising or visibility in connection with the Project.

Notwithstanding the foregoing, Contractor may include a reference to Owner and the services and equipment provided under this Agreement in a professional résumé or other similar listing of Contractor's references without seeking Owner's written consent in each instance; provided, that such reference to Owner, the services and equipment is included with at least several other similar references and is given no more prominence than such other references.

## **1.7 CONFIDENTIALITY / PROPERTY RIGHTS**

- A. Owner will retain ownership and intellectual property rights in all plans, designs, drawings, documents, concepts, and materials provided by or on behalf of Owner to Contractor and to all work products of Contractor for or relative to Work performed under this Agreement, such products, services, and Work of Contractor constituting works made for hire. Contractor will not reuse any portions of such items provided by Owner or developed by Contractor for Owner pursuant to this Agreement, or disclose any such items to any third party without the prior written consent of Owner. Owner may withhold its consent in its' absolute discretion.
- B. In addition, Contractor shall ensure that Contractor, Subcontractors, and the employees, agents and representatives of Contractor and its Subcontractors maintain in strict confidence, and shall use and disclose only as authorized by Owner all Confidential Information of Owner that Contractor receives in connection with the performance of this Agreement. Notwithstanding the foregoing, Contractor may use and disclose any information to the extent required by an order of any court or governmental authority, but only after it has notified Owner and Owner has had an opportunity to obtain reasonable protection for such information in connection with such disclosure. For purposes of this Agreement, "Confidential Information" means:
  - 1. The name or address of any affiliate, customer or contractor of Owner or any information concerning the transactions of any such person with Owner;
  - 2. Any information relating to contracts, agreements, business plans, budgets or other financial information of Owner to the extent such information has not been made available to the public by the Owner; and
  - 3. Any other information that is marked or noted as confidential by the Owner at the time of its disclosure.

## **1.8 COMPLY WITH INTELLECTUAL PROPERTY RIGHTS OF OTHERS**

Contractor represents and warrants that no Work (with its means, methods, goods, and services attendant thereto), provided to Owner will infringe or violate any right of any third party and that Owner may use and exploit such Work, means, methods, goods, and services without liability or obligation to any person or entity (specifically and without limitation, such Work, means, methods, goods, and services will not violate rights under any patent, copyright, trademark, or other intellectual property right or application for the same).

## **SECTION 2 - OWNER**

### **2.1 OWNER'S DESIGNATED REPRESENTATIVE**

Owner will designate in writing a representative who will have express authority to bind Owner with respect to all matters requiring Owner's approval or authorization.

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

- A. Owner will be responsible for establishment of property lines and benchmarks for grading.
- B. Owner will furnish to Contractor any information or services it is required to furnish under the Contract Documents with reasonable promptness to avoid delay in the orderly progress of the Work.
- C. Owner will furnish to Contractor a reasonable number of copies of the Drawings, the Project Manual, and the Addenda.

### **2.3 OWNER'S RIGHT TO INSPECT THE WORK**

Owner and its representatives will have the right to inspect any portion of the Work wherever located at any time.

### **2.4 OWNER'S RIGHT TO STOP THE WORK**

If Contractor fails to carry out the Work in accordance with the Contract Documents or fails to correct Work which is not in accordance with the Contract Documents in a timely manner, Owner may order Contractor in writing to stop the Work, or any portion thereof, until the cause for that order has been eliminated.

## **SECTION 3 - CONTRACTOR**

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

- A. By executing the Agreement, Contractor represents that it has visited the Project site, familiarized itself with the local conditions under which the Work is to be performed, and correlated its own observations with the requirements of the Contract Documents.
- B. Contractor will carefully review and compare the Contract Documents and any other available information relating to the Project prior to commencing and during performance of each portion of the Work and will immediately report to Architect any errors, inconsistencies, and omissions it discovers.
- C. Should Contractor or any of its Subcontractors become aware of any question regarding the meaning or intent of any part of the Contract Documents prior to commencing that portion of the Work about which there is a question, Contractor will request an interpretation or clarification from Architect before proceeding. Contractor proceeds at its own risk if it proceeds with the Work without first making such a request and receiving an interpretation or clarification from Architect. If neither Contractor nor its Subcontractors become aware of the question until after work on the relevant portion of the Work has commenced, then the following precedence will govern for purposes of determining whether resolution of the question constitutes a Change in the Work:
  - 1. The Agreement takes precedence over all other Contract Documents.
  - 2. The Supplementary Conditions take precedence over the General Conditions.
  - 3. The General Conditions and Supplementary Conditions take precedence over the Drawings and the Specifications.
  - 4. An Addendum or a Modification takes precedence over the document(s) modified by the Addendum or Modification.
  - 5. The Specifications take precedence over the Drawings.
  - 6. Within the Drawings, larger scale drawings take precedence over smaller scale drawings, figured dimensions over scaled dimensions, and noted materials over graphic indications.
- D. Contractor will give Architect notice of any additional drawings, specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work, sufficiently in advance of the need for information so as not to delay the Work.
- E. It is not Contractor's responsibility to ascertain that the Contract Documents are in accordance with requirements of applicable laws, statutes, ordinances, building codes, rules and regulations. However, if Contractor observes that portions of the Contract Documents are at variance with those requirements, Contractor will immediately notify Architect in writing. Contractor will not proceed unless Owner and/or Architect effects Modifications to the Contract Documents required for compliance with such requirements. Contractor will be fully responsible for any work knowingly performed contrary to such requirements and will fully indemnify Owner against loss and bear all costs and penalties arising therefrom.
- F. Contractor will take field measurements and verify field conditions and will compare such field measurements and conditions and other information known to Contractor with the Contract Documents before ordering any materials or commencing construction activities. Contractor will immediately report errors, inconsistencies, and omissions that it discovers to Architect. If Contractor orders materials or commences construction activities before taking field measurements and verifying field conditions, Contractor will not be entitled to any compensation for additional costs to Contractor resulting from field measurements or conditions different from those anticipated by Contractor which would have been avoided had Contractor taken field measurements and verified field conditions prior to ordering the materials or commencing construction activities.
- G. If site conditions indicated in the Contract Documents or other information provided by Owner or Architect to Contractor differ materially from those Contractor encounters in performance of the Work, Contractor will immediately notify Architect in writing of such differing site conditions.
- H. Where the Contract Documents require the Contractor to provide professional services for architecture or engineering, the Contractor shall cause such services to be performed by appropriately licensed professionals.

### **3.2 SUPERVISION OF CONSTRUCTION PROCEDURES**

- A. Contractor will supervise and direct the Work. Contractor will be solely responsible for all construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work. All loss, damage, liability, or cost of correcting defective work arising from the use of any construction means, methods, techniques, sequences or procedures will be borne by Contractor, notwithstanding that such construction means, methods, techniques, sequences or procedures are referred to, indicated or implied by the Contract Documents, unless Contractor has given timely notice to Owner and Architect in writing that such means, methods, techniques, sequences or procedures are not safe or suitable, and Owner has then instructed Contractor in writing to proceed at Owner's risk.
- B. Contractor will utilize its best skill, efforts, and judgment to provide efficient business administration and supervision, to furnish at all times an adequate supply of workers and materials, and to perform the Work in an expeditious and economical manner consistent with the interests of Owner.
- C. Contractor will be responsible for:
  - 1. The proper observance of property lines and set back requirements as shown in the Contract Documents;

2. The location and layout of the Work as shown in the Contract Documents with respect to the position of the Work on the property and the elevation of the Work in relation to grade; and
  3. Setting and maintaining construction stakes.
- D. Contractor will be responsible to Owner for the acts and omissions of its employees and Subcontractors as well as persons either directly or indirectly employed by Subcontractors.
  - E. Contractor will not be relieved of its obligation to perform the Work in accordance with the Contract Documents as a result of any tests, inspections, or approvals by Owner, Architect or their consultants.
  - F. Contractor will be responsible for inspection of portions of the Work already completed to determine that such portions are in proper condition to receive subsequent portions of the Work.
  - G. Contractor recognizes that the Project site and the surrounding area is frequently visited by the public and is important to Owner's image and function and will maintain the premises free from debris and waste materials resulting from Construction. At the completion of Construction, Contractor shall promptly remove construction equipment, tools, surplus materials, waste materials and debris.

### **3.3 LABOR AND MATERIALS**

- A. Unless otherwise provided in the Contract Documents, Contractor will provide and pay for all labor, materials, equipment, tools, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work.
- B. Contractor will at all times enforce strict discipline and good order among those performing the Work and will not permit employment of any unfit person or anyone not skilled in the tasks assigned to them.
- C. Contractor is fully responsible for the Project and all materials and work connected therewith until Owner has accepted the Work in writing. Contractor will replace or repair at its own expense any materials or work damaged or stolen, regardless of whether it has received payment for such work or materials from the Owner.
- D. Contractor will remedy all damage or loss to any property caused in whole or in part by Contractor, any Subcontractor, or by anyone for whose acts any of them may be liable.
- E. Contractor will be responsible for determining that all materials furnished for the Work meet all requirements of the Contract Documents. Architect may require Contractor to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of Architect, would lead to a reasonable certainty that any material used, or proposed to be used, in the work meets the requirements of the Contract Documents. All such data will be furnished at Contractor's expense. This provision will not require Contractor to pay for periodic testing of different batches of the same material, unless such testing is specifically required by the Contract Documents to be performed at Contractor's expense.
- F. Contractor will coordinate and supervise the work performed by Subcontractors so that the Work is carried out without conflict between trades and so that no trade, at any time, causes delay to the general progress of the Work. Contractor and all Subcontractors will at all times afford each trade, any separate contractor, or Owner, reasonable opportunity for the installation of Work and the storage of materials.
- G. Contractor warrants to Owner that the materials and equipment furnished for the Work will be new unless otherwise specified by the Contract Documents, and that the Work will be free from defects, and will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective in the discretion of Owner. If required by Architect, Contractor will furnish satisfactory evidence as to the kind and quality of the materials and equipment used in performing the Work.
- H. Owner may elect to purchase materials required for the Work. In that event, Contractor will comply with the procedures set forth in the Contract Documents relating to such materials.

### **3.4 COMPLIANCE WITH LAWS**

Contractor will comply with all applicable laws, ordinances, rules, regulations, and orders of any public authorities relating to performance of the Work.

### **3.5 TAXES**

- A. Contractor will pay all sales, use, consumer, payroll, workers compensation, unemployment, old age pension, surtax, and similar taxes assessed in connection with the performance of the Work.
- B. Owner will pay all taxes and assessments on the real property comprising the Project site.

### **3.6 PERMITS AND FEES**

- A. Owner will obtain and pay for all zoning and use permits and permanent easements necessary for completion of the Work.

- B. Contractor will obtain and pay for the building permit, and all other permits, governmental fees, licenses and inspections necessary for the proper execution and completion of the Work.
- C. Contractor will secure any certificates of inspection and of occupancy required by authorities having jurisdiction over the Work. Contractor will deliver these certificates to Architect prior to issuance of the Certificate of Substantial Completion by Architect.

### **3.7 CONTRACTOR'S ON-SITE REPRESENTATIVE**

Contractor will employ a competent representative acceptable to Owner to supervise the performance of the Work. This representative will be designated in writing by Contractor prior to commencement of work and will not be changed prior to final inspection of the Work without prior written consent of Owner. This representative will represent Contractor for all purposes, including communication with Owner.

### **3.8 CONTRACTOR'S CONSTRUCTION SCHEDULES**

- A. Contractor will prepare and submit for Owner's and Architect's information Contractor's construction schedule for the Work in accordance with the requirements of the Contract Documents.
- B. Contractor will prepare and maintain a Submittal schedule which is coordinated with Contractor's construction schedule and sets forth specified times for Architect to review Submittals.

### **3.9 DOCUMENTS AND SUBMITTALS AT THE SITE**

Contractor will keep at the Project site for use by Owner, Architect, or their representatives, a record copy of the Project Manual, the Drawings, all Addenda, and all Modifications. These documents will be maintained in good order and currently marked to record changes and selections made during construction. In addition, Contractor will keep at the Project site one copy of all Submittals.

### **3.10 SUBMITTALS**

- A. Submittals are not Contract Documents and do not alter the requirements of the Contract Documents unless incorporated into the Contract Documents by a Modification.
- B. Contractor will review, approve, and submit to Architect Submittals in accordance with the Contract Documents. By approving Submittals, Contractor represents that it has determined and verified field measurements, field construction criteria, materials, catalog numbers, and similar data, and that it has checked and coordinated each Submittal with the requirements of the Work and of the Contract Documents or will make such determination, verification, check, and coordination prior to commencing the relevant portion of the Work. In reviewing Submittals Architect will be entitled to rely upon Contractor's representation that such information is correct and accurate.
- C. Contractor will inform Architect in writing at the time of submission of any Submittal or portion thereof which deviates from the requirements of the Contract Documents. Contractor will provide Architect with documentation demonstrating to Architect that the Submittal is equal to or better than the specified product or work. Contractor will not be relieved of responsibility for deviations from the requirements of the Contract Documents by Architect's acceptance of a Submittal unless Contractor has informed Architect in writing of the deviation and Architect has incorporated the deviation into the Contract Documents by a Modification.
- D. Contractor will not perform any portions of the Work requiring Submittals until the respective Submittal has been reviewed and accepted in writing by Architect.
- E. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, Owner will be entitled to rely upon such certifications, and neither Owner nor Architect will be expected to make any independent examination with respect thereto.
- F. Submittals not required by the Contract Documents may be returned to Contractor without action.

### **3.11 CUTTING AND PATCHING**

Contractor will be responsible for any cutting, fitting, and patching that may be required to complete the Work and make its parts fit together properly.

### **3.12 ACCESS TO WORK**

Contractor will permit Owner, Architect, their representatives and consultants, access to the Work wherever located at any time.

### **3.13 ROYALTIES AND PATENTS**

Contractor will pay all royalties and license fees required by the Work or by Contractor's chosen method of performing the Work. Contractor will defend and hold Owner harmless from all suits or claims for infringement of any patent, license or other intellectual property rights or any loss on account thereof.

### **3.14 INDEMNIFICATION**

- A. Contractor will indemnify and hold harmless Owner and Owner's representatives, employees, agents, architects, and consultants from and against any and all claims, damages, liability, demands, costs, judgments, awards, settlements, causes of action, losses and expenses (collectively "Claims" or "Claim"), including but not limited to attorney fees, consultant fees, expert fees, copy costs, and other expenses, arising out of or resulting from performance of the Work, attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of real or personal property, including loss of use resulting therefrom, except to the extent that such liability arises out of the negligence of Owner, its representatives, agents, and employees. This indemnity includes, without limitation, indemnification of Owner from all losses or injury to Owner's property, except to the extent that such loss or injury arises out of the negligence of Owner, its representatives, agents, and employees. This indemnity applies, without limitation, to include Claims occurring both during performance of the Work and/or subsequent to completion of the Work. In the event that any Claim is caused in part by a party indemnified hereunder, that party will bear the cost of such Claim to the extent it was the cause thereof. In the event that a claimant asserts a Claim for recovery against any party indemnified hereunder, the party indemnified hereunder may tender the defense of such Claim to Contractor. If Contractor rejects such tender of defense and it is later determined that the negligence of the party indemnified hereunder did not cause all of the Claim, Contractor will reimburse the party indemnified hereunder for all costs and expenses incurred by that party in defending against the Claim. Contractor will not be liable hereunder to indemnify any party for damages resulting from the sole negligence of that party.
- B. In addition to the foregoing, Contractor will be liable to defend Owner in any lawsuit filed by any Subcontractor relating to the Project. Where liens have been filed against Owner's property, Contractor (and/or its bonding company which has issued bonds for the Project) will obtain lien releases and record them in the appropriate county and/or local jurisdiction and provide Owner with a title free and clear from any liens of Subcontractors. In the event that Contractor and/or its bonding company are unable to obtain a lien release, Owner in its absolute discretion may require Contractor to provide a bond around the lien or a bond to discharge the lien, at Contractor's sole expense.
- C. In addition to the foregoing, Contractor will indemnify and hold Owner harmless from any claim of any other contractor resulting from the performance, nonperformance or delay in performance of the Work by Contractor.
- D. The indemnification obligation herein will not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or a Subcontractor under worker's compensation acts, disability benefit acts, or other employee benefit acts.

### **3.15 PROJECT MEETINGS**

Contractor will attend and participate in meetings as required by the Contract Documents.

## **SECTION 4 - ADMINISTRATION OF THE CONTRACT**

### **4.1 ARCHITECT**

In the event that Owner terminates its contractual relationship with Architect, Owner will appoint in writing another architect, whose status under the Contract Documents will be that of the former Architect in all respects.

### **4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT**

- A. Architect will make periodic visits to the site to familiarize itself generally with the progress and quality of the Work and to determine if the Work is proceeding in accordance with the Contract Documents. Although Architect is required to make periodic inspections, it is not required to make exhaustive or continuous onsite inspections. On the basis of its observations while at the site, Architect will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defects and deficiencies in the Work. Architect's failure to observe a defect or deficiency in the Work will not relieve Contractor of its duty to perform the Work in accordance with the Contract Documents.
- B. Architect will review Contractor's payment requests and determine the amounts due Contractor in accordance with Section 9.
- C. Communications between Contractor and Owner relating to the Work will be through Architect. Communications between Owner or Contractor with Architect's consultants relating to the Work will be through Architect. Communications between Owner or Architect and subcontractors relating to the Work will be through Contractor. Communications between Contractor and any separate contractor will be through Architect, except as otherwise specified in the Contract Documents.
- D. Owner and/or Architect will have the right to reject and require removal of the following at Contractor's expense:
  1. Any portion of the Work that does not meet the requirements of the Contract Documents.
  2. Any portion of the Work damaged or rendered unsuitable during installation or resulting from failure to exercise proper protection.
- E. Architect will have authority to suspend the Work, with concurrence of Owner, whenever such suspension may be necessary in its reasonable opinion to insure the proper performance of the Work.
- F. Architect will review Contractor's Submittals and will accept or take other appropriate action regarding the Submittals. Architect's review of the Submittals will be for the limited purpose of checking for general conformance with the Contract Documents and will not be conducted for the purpose of determining the accuracy and completeness of 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 Contractor. Architect's review of Submittals will not relieve Contractor of its obligations under the Contract Documents. Architect's review of Submittals will not constitute acceptance of safety precautions or construction

means, methods, techniques, sequences or procedures. Architect's acceptance of a specific item will not indicate acceptance of an assembly of which the item is a component.

- G. Architect has authority to order Construction Change Directives and Field Changes in accordance with Section 7.
- H. Architect will conduct inspections to determine the dates of Substantial Completion and final completion, will receive and review written guarantees and related documents required by the Contract and assembled by Contractor, and will review and certify or reject Contractor's final payment request.
- I. Architect will be the interpreter of the performance and requirements of the Contract Documents. Architect's interpretations will be in writing or in the form of drawings.
- J. Architect's decisions in matters relating to aesthetic effect will be final if consistent with the Contract Documents and approved by Owner.

## **SECTION 5 - SUBCONTRACTORS**

### **5.1 AWARD OF SUBCONTRACTS FOR PORTIONS OF THE WORK**

- A. Contractor will enter into contracts with Subcontractors to perform all portions of the Work that Contractor does not customarily perform with its own employees.
- B. Contractor will not contract with any Subcontractor who has been rejected by Owner. Contractor will not be required to contract with any Subcontractor against whom it has a reasonable objection.
- C. If Owner rejects any Subcontractor proposed by Contractor, Contractor will propose an acceptable substitute to whom Owner has no reasonable objection.
- D. Contractor will not make any substitution for any Subcontractor that has been accepted by Owner and Architect without the prior written approval of Owner and Architect.

### **5.2 SUBCONTRACTUAL RELATIONS**

- A. Contractor's responsibility for the Work includes the labor and materials of all Subcontractors, including those recommended or approved by Owner. Contractor will be responsible to Owner for proper completion and guarantee of all workmanship and materials under any subcontracts. Any warranties required for such work will be obtained by Contractor in favor of Owner and delivered to Architect. It is expressly understood and agreed that there is no contractual relationship between Owner and any Subcontractor, and under no circumstances will Owner be responsible for the non-performance or financial failure of any Subcontractor or any effects therefrom.
- B. Contractor agrees to pay the Subcontractors promptly upon receipt of payment from Owner for that portion of the funds received which represents the Subcontractor's portion of the Work completed to Contractor's satisfaction for which Owner has made payment.
- C. Contractor will require each Subcontractor to:
  - 1. Be licensed by the state in which the Project is located where such licensing is required by the governing authority;
  - 2. Be bound by the terms of the Contract Documents as far as they are applicable to the Subcontractor's work;
  - 3. Assume toward Contractor the same obligations Contractor has assumed toward Owner, including the prompt payment of its Subcontractors;
  - 4. Submit its applications for payment to Contractor in time to permit Contractor to make timely application to Owner;
  - 5. Execute claim or lien releases or lien waivers for payments made by Contractor; and
  - 6. Make all claims for Changes in the Work to Contractor in the same manner as Contractor is required to make such claims to Owner.

## **SECTION 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

### **6.1 OWNER'S RIGHT TO PERFORM WORK OR AWARD SEPARATE CONTRACTS**

- A. Owner reserves the right to perform work itself or to award separate contracts in connection with the Project.
- B. When separate contracts are awarded, "Contractor" in the Contract Documents in each case will mean the contractor who signs each separate contract.

### **6.2 MUTUAL RESPONSIBILITY**

- A. Contractor will afford other contractors reasonable opportunity to place and store their materials and equipment on site and to perform their work and will properly connect and coordinate its Work with theirs where applicable.
- B. If any part of Contractor's Work depends upon the work of any separate contractor for proper performance or results, Contractor will inspect and promptly report to Architect any apparent discrepancies or defects in such work that render it unsuitable for

proper performance and results. Failure of Contractor to so inspect and report will constitute an acceptance of the work of the separate contractor as fit and proper to receive Contractor's Work, except as to defects not then reasonably discoverable.

- C. Contractor will promptly remedy damage caused by Contractor or any Subcontractor to the completed or partially completed work of other contractors or to the property of Owner or other contractors.

### **6.3 OWNER'S RIGHT TO CLEAN UP**

If a dispute arises among Contractor and separate contractors as to the responsibility under their separate contracts for maintaining the Project free from waste materials and rubbish, Owner may clean the Project, allocate the cost among those responsible as Owner and Architect determine to be just, and withhold such cost from any amounts due or to become due to Contractor.

## **SECTION 7 - CHANGES IN THE WORK**

### **7.1 CHANGES IN THE WORK RESULTING FROM AN INSTRUCTION BY OWNER OR ARCHITECT TO CONTRACTOR**

- A. If Owner or Architect gives Contractor an instruction that modifies the requirements of the Contract Documents or delays Substantial Completion, Contractor may be entitled to an adjustment in the Contract Sum and/or the Contract Time. If compliance with the instruction affects the cost to Contractor to perform the Work, the Contract Sum will be adjusted to reflect the reasonable increase or decrease in cost subject to the conditions set forth in Section 7.1, Paragraphs B through G. If compliance with the instruction delays Substantial Completion, the Contract Time will be extended for a period of time commensurate with such delay subject to the conditions set forth in Section 7.1, Paragraphs B through G and Section 7.3, Paragraph A and Contractor will be paid liquidated damages for the delay as set forth in Section 7.3, Paragraph B.
- B. If Contractor receives an instruction from Owner or Architect that Contractor considers to be a Change in the Work, Contractor, before complying with the instruction, will notify Architect in writing that Contractor considers such instruction to constitute a Change in the Work. If Architect agrees that compliance with the instruction will constitute a Change in the Work, Contractor will furnish a proposal for a Modification in accordance with Section 7.1, Paragraphs C. and D. within ten (10) days.
- C. If Contractor claims that it is entitled to an adjustment in the Contract Sum (including without limitation costs related to a time extension) as a result of an instruction by Owner or Architect, Contractor will furnish a proposal for a Change Order containing a price breakdown itemized as required by Owner. The breakdown will be in sufficient detail to allow Owner to determine any increase or decrease in Direct Costs as a result of compliance with the instruction. Any amount claimed for subcontracts will be supported by a similar price breakdown and will itemize the Subcontractor's profit and overhead charges. Profit and overhead will be subject to the following limitations:
  - 1. The Subcontractor's profit and overhead will not exceed ten (10) percent of its Direct Costs on work performed. Subcontractor's profit and overhead will not exceed five (5) percent on work performed by its sub-subcontractors.
  - 2. Contractor's profit and overhead on work performed by its own crews will not exceed ten (10) percent of its Direct Costs.
  - 3. Contractor's profit and overhead mark up on work performed by its Subcontractors will not exceed five (5) percent of the Subcontractors' charges for such work.
  - 4. Amounts due Owner as a result of a credit change will be the actual net savings to Contractor from the Change in the Work as confirmed by Architect. On credit changes, profit and overhead on the originally estimated work will not be credited back to Owner. If both additions and credits are involved in a single Change in the Work, overhead and profit will be figured on the basis of net increase, if any, related to that Change in the Work.
- D. If Contractor claims that it is entitled to an adjustment in the Contract Time as a result of an instruction from Owner or Architect, Contractor will include in its proposal justification to support Contractor's claim that compliance with the instruction will delay Substantial Completion.
- E. Upon receipt of Contractor's proposal for Modification, Architect and Owner will determine whether to proceed with the Change in the Work. If Architect and Owner determine to proceed with the Change in the Work, they will issue a Change Order, a Construction Change Directive or a Field Change as appropriate.
- F. Contractor agrees that if it complies with an instruction from Owner or Architect without first giving written notice to Architect as provided in Section 7.1., Paragraph B, and receiving a Change Order, Construction Change Directive or Field Change, Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time as a result of the instruction and waives any claim therefor.
- G. If Contractor is instructed to perform work which it claims constitutes a Change in the Work but which Owner and Architect do not agree constitutes a Change in the Work, Contractor will comply with the instruction. Contractor may submit its claim for adjustment to the Contract Sum, the Contract Time, or both as a dispute pursuant to Section 13 within thirty (30) days after compliance with the instruction. Contractor agrees that if it fails to submit its claim for resolution pursuant to Section 13 within thirty (30) days after compliance with the instruction, then Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time as a result of the instruction and waives any claim therefor.
- H. Contractor agrees that it is responsible for submitting accurate cost and pricing data to support its Change Order Proposals. Owner will have the right to examine the Contractor's records to verify the accuracy and appropriateness of the pricing data used to price change order proposals.

### **7.2 CHANGE IN THE WORK RESULTING FROM AN EVENT OR CIRCUMSTANCE**

- A. If an event or circumstance other than an instruction from Owner or Architect affects the cost to Contractor of performing the Work or delays Substantial Completion, Contractor may be entitled to an adjustment in the Contract Sum and/or the Contract Time. If the circumstance or event affects the cost to Contractor to perform the Work and is caused by a willful or negligent act or omission of Owner or Architect, the Contract Sum will be adjusted to reflect the reasonable increase or decrease in Contractor's cost to perform the Work resulting from the event or circumstance, subject to the conditions set forth in Section 7.2, Paragraphs B through F. If the event or circumstance delays Substantial Completion and is described in Section 7.3, Paragraph A, the Contract Time will be extended for a period of time commensurate with such delay subject to the conditions set forth in such section. If the circumstance or event delays Substantial Completion and is caused by a willful or negligent act or omission of Owner or Architect, then Contractor will be compensated for costs incident to the delay in accordance with Section 7.3, Paragraph B. Contractor will not be entitled to any adjustment to the Contract Sum or other damages from Owner as a result of any event or circumstance unless the event or circumstance results from a willful or negligent act or omission of Owner or Architect.
- B. If a Change in the Work results from any event or circumstance caused by the willful or negligent act or omission of Owner or Architect, Contractor will give Owner Written Notice of such event or circumstance within twenty-four (24) hours after commencement of the event or circumstance so that Owner can take such action as is necessary to mitigate the effect of the event or circumstance. Contractor will not be entitled to any adjustment in either the Contract Time or the Contract Sum based on any damages or delays resulting from such event or circumstance during a period more than twenty-four (24) hours prior to Contractor giving such Written Notice to Owner.
- C. Contractor will submit in writing any claims for an adjustment in the Contract Time and/or the Contract Sum resulting from an event or circumstance within the time limits set forth below. In the event that Contractor fails to submit its claim in writing within the time limits set forth below, then Contractor agrees it will not be entitled to any adjustment in the Contract Time or the Contract Sum or to any other damages from Owner due to the circumstance or event and waives any claim therefor.
  - 1. Claims for an adjustment in the Contract Time due to Adverse Weather will be made by the tenth (10th) of the month following the month in which the delay occurred.
  - 2. Claims for an adjustment in the Contract Time and/or the Contract Sum due to any other circumstance or event will be submitted within seven (7) days after the occurrence of the circumstance or event.
- D. If Contractor claims that it is entitled to an adjustment in the Contract Sum (including without limitation costs related to a time extension) because of an event or circumstance resulting from the willful or negligent act or omission of Owner or Architect, Contractor will furnish a proposal for a Change Order containing a price breakdown as described in Section 7.1, Paragraph C. Any amount claimed for increased labor costs as a result of the event or circumstance must be supported by a certified payroll. Any claim for rented equipment or additional material costs must be supported by invoices.
- E. If Contractor claims that it is entitled to an adjustment in the Contract Time as a result of an event or circumstance, Contractor will include with its claim copies of daily logs, letters, shipping orders, delivery tickets, Project schedules, and other supporting information necessary to justify Contractor's claim that the event or circumstance delayed Substantial Completion. If Contractor is entitled to an adjustment in the Contract Time as a result of an event or circumstance caused by the willful or negligent act or omission of Owner or Architect, Contractor will be compensated for all costs related to the delay in accordance with Section 7.3, Paragraph B.
- F. Within thirty (30) days after receipt of Contractor's claim, Architect will either deny the claim or recommend approval to Owner. If Owner approves the claim, the adjustment in the Contract Time and/or Contract Sum will be reflected in a Change Order pursuant to Section 7.5 or a Construction Change Directive pursuant to Section 7.6. If Owner or Architect denies Contractor's claim, Contractor may submit its claim as a dispute pursuant to Section 13 within thirty (30) days of receipt of the denial of the claim. If Contractor fails to submit its claim for resolution pursuant to Section 13 within the thirty (30) day time period, then Contractor agrees it is not entitled to any adjustment in the Contract Time and/ or Contract Sum or any other damages as a result of the event or circumstance and waives any claim therefor.

### 7.3 EXTENSIONS OF TIME

- A. If Substantial Completion of the Project is delayed because of any of the following causes, then the Contract Time will be extended by Change Order for a period of time equal to such delay:
  - 1. Labor strikes or lock-outs;
  - 2. Adverse weather;
  - 3. Unusual delay in transportation;
  - 4. Unforeseen governmental requests or requirements;
  - 5. A Change in the Work resulting from an instruction by Owner or Architect to Contractor subject to the conditions set forth in Section 7.1; or
  - 6. Any other event or circumstance caused by the willful or negligent act or omission of Owner or Architect.
- B. Contractor will not be entitled to any compensation for delay described in Section 7.3, Paragraph A, subparagraphs 1, 2, 3 and 4. For each day of delay in Substantial Completion described in Section 7.3, Paragraph A, subparagraphs 5 and 6, Contractor will be paid liquidated damages in the amount per day set forth in the Supplementary Conditions to compensate Contractor for all damages resulting from any delay including but not limited to damages for general conditions costs, additional job site costs, additional home office overhead costs, disruption costs, acceleration costs, increase in labor costs, increase in subcontract costs, increase in materials costs, and any other costs incident to the delay. Contractor will be entitled to no other compensation relating to the delay.



- C. In no event will any time extension or cost adjustment be given on account of delay which reasonably should have been anticipated by the Contractor or in circumstances where performance of the Work is, was, or would have been, delayed by any other cause for which the Contractor is not entitled to an extension.

#### **7.4 DOCUMENTATION OF CHANGES IN THE WORK**

Every Change in the Work will be documented by a Change Order, a Construction Change Directive or a Field Change. If Owner, Architect and Contractor reach agreement regarding the adjustment in the Contract Sum, if any, and the adjustment in the Contract Time, if any, resulting from a Change in the Work, then the parties will execute a Change Order pursuant to Section 7.5. If Owner, Architect and Contractor cannot reach agreement regarding the adjustment in Contract Sum or the adjustment in Contract Time resulting from a Change in the Work, then Owner and Architect will issue a Construction Change Directive pursuant to Section 7.6. Field Changes require the agreement of Architect and Contractor only.

#### **7.5 CHANGE ORDERS**

Contractor's signature upon a Change Order is Contractor's acknowledgment that it is not entitled to any additional adjustment in the Contract Sum or the Contract Time or any other damages or compensation as a result of the Change in the Work other than that provided for in the Change Order, irrespective of whether a subsequent claim for additional compensation or time extensions relating to the Change in the Work is described as a change in the requirements of the Contract Documents, a delay, a disruption of the Work, an acceleration of the Work, an impact on the efficiency of performance of the Work, an equitable adjustment, or other claim and irrespective of whether the impact of the Change in the Work is considered singly or in conjunction with the impact of other Changes in the Work.

#### **7.6 CONSTRUCTION CHANGE DIRECTIVES**

- A. Contractor will promptly comply with all Construction Change Directives.
- B. Pending final resolution of any adjustment in the Contract Sum or Contract Time relating to a Construction Change Directive, the amounts proposed by Owner in the Construction Change Directive may be included in Contractor's payment requests once the work relating thereto is completed.
- C. If after the work described in the Construction Change Directive is completed, Owner, Architect, and Contractor reach agreement on adjustments in the Contract Sum, Contract Time, or both, such agreement will be reflected in an appropriate Change Order.
- D. If the parties do not reach agreement regarding an adjustment to the Contract Sum, Contract Time, or both relating to the Construction Change Directive within thirty (30) days of the completion of the work described therein, then Contractor may submit its claim for an adjustment pursuant to Section 13 within thirty (30) days of the completion of such work. Contractor agrees that if it fails to submit its claim for resolution pursuant to Section 13 within thirty (30) days of completion of the work described in the Construction Change Directive, then it will not be entitled to an adjustment in Contract Sum or Contract Time resulting from such work except as set forth in the Construction Change Directive and waives any claim therefor.

#### **7.7 FIELD CHANGES**

Architect and Contractor will sign a Field Change order listing the Change In The Work and the Contract Sum including markups before Contractor proceeds with the Field Change.

#### **7.8 WAIVER OF CLAIMS**

Except as set forth in Section 7, Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time or for any damages of any kind whatsoever resulting from an instruction from Owner or Architect, any event or circumstance, or any act or omission of Owner or Architect and Contractor expressly waives any and all claims therefor.

### **SECTION 8 - TIME**

#### **8.1 TIME IS OF THE ESSENCE**

All time limits stated in the Contract Documents are of the essence. By executing the Agreement, Contractor confirms that the Contract Time is a reasonable period for performing the Work. Contractor will proceed expeditiously with adequate resources and will achieve Substantial Completion within the Contract Time.

#### **8.2 COMMENCEMENT OF THE WORK**

Contractor will not commence work on the Project site until the date set forth in the Written Notice to proceed. However, Contractor may enter into subcontracts and secure material for the Project after receipt of the Agreement with Owner's authorized signature. Owner will issue the Written Notice to proceed within forty-five (45) days after Owner receives acceptable bonds and evidence of insurance pursuant to Section 11 unless Owner earlier terminates the Agreement pursuant to Section 14.

#### **8.3 DELAY IN COMPLETION OF THE WORK**

- A. For each day after the expiration of the Contract Time that Contractor has not achieved Substantial Completion, Contractor will pay Owner the amount set forth in the Supplementary Conditions as liquidated damages for Owner's loss of use of the Project

and the added administrative expense to Owner to administer the Project during the period of delay. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay. Owner may deduct any liquidated damages or reimbursable expenses from any money due or to become due to Contractor. If the amount of liquidated damages and reimbursable expenses exceeds any amounts due to Contractor, Contractor will pay the difference to Owner within ten (10) days after receipt of a written request from Owner for payment.

- B. At the time Architect certifies that Contractor has achieved Substantial Completion, Architect will identify the remaining items to be completed for final completion of the Work and will establish with Contractor a reasonable time for completion of those items. Architect will set forth the items to be completed and the time established for their completion in a Certificate of Substantial Completion. For each day that Contractor exceeds the time allowed for completion of the items set forth in the Certificate of Substantial Completion, Contractor will pay to Owner as liquidated damages for additional administrative expenses the amount set forth in the Supplementary Conditions. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay in completing such items.

## **SECTION 9 - PAYMENTS AND COMPLETION**

### **9.1 SCHEDULE OF VALUES**

Contractor will submit to Architect a schedule of values which allocates the Contract Sum to various portions of the Work. The schedule of values will be supported by such data to substantiate its accuracy as required by Architect. This schedule, when accepted by Owner and Architect, will be used as a basis for reviewing Contractor's payment requests.

### **9.2 PAYMENT REQUESTS**

- A. Not more than once a month, Contractor will submit a payment request to Architect for Work completed, materials stored on the site, and for materials stored offsite as of the date of the payment request. The amount of the payment request will be based upon the schedule of values and will be equal to the value of the Work completed:

1. Less retention;
2. Less all prior amounts paid by Owner to Contractor as part of the Contract Sum; and
3. Less allowable offsets.

The payment request may include Changes in the Work that have been performed by Contractor and authorized by Owner and/or Architect pursuant to Section 7. If a payment request includes materials stored offsite, Contractor will include with the payment request a list of the materials, the location where they are stored and the written request of Contractor and its performance bond surety that payment be made for such materials.

- B. Contractor warrants and guarantees that upon the receipt of payment for materials and equipment, whether incorporated in the Project or not, title to such materials and equipment will pass to Owner free and clear of all liens, claims, security interests, or encumbrances. Notwithstanding this payment and passage of title, Contractor will remain responsible for all such materials and equipment until actual delivery to the project site, incorporation into the Work, and final acceptance by Owner. Contractor further warrants that no material or equipment covered by a payment request is subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or any other person or entity.

### **9.3 PAYMENT REQUEST CERTIFICATION**

- A. Architect will, within seven (7) days after receipt of Contractor's payment request, forward to Owner the payment request certified for such amount as Architect determines is properly due. If Architect certifies less than the full amount of the payment request, Architect will notify Contractor and Owner of Architect's reasons for withholding certification of the full amount requested.
- B. The certification of the payment request will constitute a representation by Architect to Owner based upon Architect's observations at the site and the data comprising the payment request, that the Work has progressed to the point indicated and that, to the best of Architect's knowledge, information, and belief, 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 minor deviations from the Contract Documents correctable prior to completion, and to specific qualifications expressed by Architect. However, the certification of the payment request will not constitute a representation that Architect has:
  1. Conducted exhaustive or continuous on-site inspections to check the quantity or quality of the Work;
  2. Reviewed construction means, methods, techniques, sequences, or procedures;
  3. Reviewed copies of requisitions received from Subcontractors or other data requested by Owner to substantiate Contractor's right to payment; or
  4. Made examination to ascertain how or for what purpose Contractor has used money previously paid on account of the Contract Sum.
- C. In taking action on Contractor's payment request, Owner will be entitled to rely on the accuracy and completeness of the information furnished by Contractor.

### **9.4 DECISIONS TO WITHHOLD CERTIFICATION AND PAYMENT**

- A. Architect may withhold certification of a payment request in whole or in part to the extent reasonably necessary to protect Owner if, in the opinion of Architect, the representations to Owner required by Section 9.3, Paragraph B cannot be accurately made. If

Architect is unable to certify payment in the amount of the payment request, Architect will notify Contractor and Owner as provided in Section 9.3, Paragraph A. If Contractor and Architect cannot agree on a revised amount, Architect will promptly certify a payment request for the amount for which Architect is able to make such representations to Owner. Architect may also decide not to certify payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a payment request previously certified, to such extent as may be necessary in Architect's opinion to protect Owner from loss because of:

1. Defective work not remedied;
2. Third-party claims filed or reasonable evidence indicating probable filing of such claims;
3. Failure of Contractor to make payments properly to Subcontractors for labor, materials, equipment, construction or services;
4. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
5. Damage to Owner or another contractor for which Contractor is responsible;
6. Reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance will not be adequate to cover the cost of completing the Work and damages for the anticipated delay; or
7. Contractor's persistent failure to carry out the Work in accordance with the Contract Documents.

- B. Owner reserves the right to withhold payments to Contractor, subsequent to Architect's certification of any payment request, in order to protect Owner from loss due to any condition described in Section 9.4, Paragraph A, Subparagraphs 1 through 7. Upon satisfactory resolution of any such conditions, payments so withheld will be made.

## **9.5 PROGRESS PAYMENTS**

- A. Owner will pay Contractor progress payments within the parameters of Section 9.2 within fifteen (15) days after Owner receives the certified payment request from Architect.
- B. Owner will make payments to Contractor by either placing the payments in the mail addressed to Contractor or by electronic transfer at Owner's discretion.
- C. Upon receipt of any payment from Owner, Contractor will pay to each Subcontractor the amount paid to Contractor on account of such Subcontractor's portion of the Work.
- D. Contractor will maintain a copy of each payment request at the Project site for review by the Subcontractors.
- E. No payment made under the Contract Documents, either in whole or in part, will be construed to be an acceptance of defective or improper materials or workmanship.
- F. In addition and notwithstanding the foregoing, Owner will also withhold and retain 10% of payments made to Contractor.
- G. Owner will pay any unpaid retention less any amounts withheld pursuant to Section 9.4 within forty-five (45) days after Contractor achieves Substantial Completion, submits its payment request for retained funds, delivers to the Architect Owner's form entitled "Contractor's Substantial Completion Affidavit and Consent of Surety" fully executed by Contractor and its surety, obtains Waiver and Release documents executed by all subcontractors and suppliers having claim against the retained funds, and Owner receives a certificate of occupancy.

## **9.6 FINAL PAYMENT**

- A. Owner will make full and final payment of the Contract Sum within thirty (30) days of the completion of all of the following requirements:
1. Contractor has submitted its final payment request;
  2. Architect has declared to Owner in writing that the Work is complete;
  3. Contractor has obtained waiver and release upon final payment documents executed by all of the subcontractors performing work and/or providing materials covered by the Contractor's final payment request; and
  4. Contractor has collected and provided to Owner all manufacturers' and other guaranties and warranties, properly signed and endorsed to Owner, that are required by the Contract Documents that extend for a period beyond one year after substantial completion. (Delivery of such guaranties and warranties will not relieve Contractor for any obligation assumed under any other provision of the Contract Documents.).
- B. Acceptance of final payment by Contractor or any Subcontractor will constitute a waiver of claims by the payee except for those claims previously made in writing pursuant to Section 7 and identified by Contractor in its affidavit as still pending.
- C. If the aggregate of previous payments made by Owner exceeds the amount due Contractor, Contractor will reimburse the difference to Owner.

# **SECTION 10 - PROTECTION OF PERSONS AND PROPERTY**

## **10.1 SAFETY PRECAUTIONS AND PROGRAMS**

Contractor will be responsible to Owner for initiating and supervising all safety programs in connection with the performance of the Work.

## **10.2 SAFETY OF PERSONS AND PROPERTY**

- A. Contractor will take reasonable precautions to prevent damage, injury, or loss to:

1. All persons on the site;
  2. The Work and materials and equipment to be incorporated into the Work; and
  3. Other property at the site or adjacent to it.
- B. Contractor will give notices and comply with applicable laws, ordinances, rules, regulations, and other lawful requirements of public authorities bearing on the safety or protection of persons and property. No work will be performed that may pose an undue safety hazard to Contractor, Contractor's employees, or any other person.
- C. Contractor will designate a responsible member of its organization at the site whose duty will be the prevention of accidents. This person will be Contractor's onsite representative unless otherwise designated in writing by Contractor to Owner and Architect.

### 10.3 EMERGENCIES

In case of an emergency endangering life or threatening the safety of any person or property, Contractor may, without waiting for specific authorization from Architect or Owner, act at its own discretion to safeguard persons or property. Contractor will immediately notify Architect of such emergency action and make a full written report to Architect within five (5) days after the event.

### 10.4 HAZARDOUS MATERIALS

In the event the Contractor encounters on the site material reasonably believed to be hazardous materials which have not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and Architect in writing. The Work in the affected area shall be resumed in the absence of hazardous materials, or when it has been rendered harmless, by written agreement of the Owner and Contractor.

## SECTION 11 - INSURANCE AND BONDS

### 11.1 CONTRACTOR'S LIABILITY INSURANCE

- A. Contractor will obtain the following insurance and provide evidence thereof as described below prior to commencement of the Work or within ten (10) days after signing the Agreement, whichever is earlier:
1. Workers Compensation Insurance.
  2. Employers Liability Insurance with minimum limits of the greater of \$500,000 E.L. each accident, \$500,000 E. L. disease-each employee, \$500,000 E.L. disease-policy limit or as required by the law of the state in which the Project is located.
  3. Commercial General Liability Insurance – ISO Form CG 00 01 (12/07) or equivalent Occurrence policy which will provide primary coverage to the additional insureds (the Owner and the Architect) in the event of any Occurrence, Claim, or Suit with:
    - a. Limits of the greater of Contractor's actual coverage amounts or the following:
      - 1) \$2,000,000 General Aggregate;
      - 2) \$2,000,000 Products - Comp/Ops Aggregate;
      - 3) \$1,000,000 Personal and Advertising Liability;
      - 4) \$1,000,000 Each Occurrence;
      - 5) \$50,000 Fire Damage to Rented Premises (Each Occurrence).
    - b. Endorsements attached to the General Liability policy including the following or their equivalent:
      - 1) ISO Form CG 25 03 (05/09), Amendment of Limits of Insurance (Designated Project or Premises), describing the Agreement and specifying limits as shown above.
      - 2) ISO Form CG 20 10 (07/04), Additional Insured -- Owners, Lessees, Or Contractors (Form B), naming Owner and Architect as additional insureds.
  4. Automobile Liability Insurance, with:
    - a. Combined Single Limit each accident in the amount of \$1,000,000 or Contractor's actual coverage, whichever is greater; and
    - b. Coverage applying to "Any Auto."
- B. Contractor will provide evidence of such insurance to Owner as follows:
1. Deliver to Owner a Certificate of Liability Insurance, on ACORD 25 (2010/05) Form, or equivalent:
    - a. Listing Owner and its consultants as the Certificate Holders and Additional Insured on the general liability and any excess liability policies;
    - b. Attaching the ISO or equivalent endorsements set forth above to the Certificate of Liability Insurance;
    - c. Identifying the Project;
    - d. Listing the insurance companies providing coverage (All companies listed must be rated in A.M. Best Company Key Rating Guide-Property-Casualty and each company must have a rating of B+ Class VII or better. Companies which are not rated are not acceptable); and
    - e. Bearing the name, address and telephone number of the producer and signed by an authorized representative of the producer. The signature may be original, stamped, or electronic.
- C. Contractor will maintain, from commencement of the Work, Insurance coverage required herein as follows:
1. Commercial General Liability Insurance through expiration of warranty period specified in Section 12.2, Paragraph B. including completion of any warranty repairs; and
  2. All other insurance through Final Payment.
- D. Owner reserves the right to reject any insurance company, policy, endorsement, or certificate of insurance with or without cause.

- E. Owner may, in writing and at its sole discretion, modify the insurance requirements.
- F. The cost of insurance as required above will be the obligation of Contractor. Contractor will be responsible for payment of all deductible amounts under all insurance.
- G. Owner will provide builders risk insurance for the cost of the Project. The policy will be written on an all risk basis with coverage for perils of wind, flood, earthquake, and terrorism, with exclusions standard for the insurance industry. The policy will be subject to a \$5,000 deductible per occurrence which will be the responsibility of Contractor and will not be a reimbursable expense. Owner will provide a copy of the terms and conditions of the builders risk policy to Contractor upon Contractor's request. Contractor will comply with terms, conditions, and deadlines of the builders risk policy. The terms, conditions, and deadlines of the builders risk policy shall govern coverage. In addition, when there is a loss which may be covered by the builders risk insurance policy, Contractor will comply with the following:
  1. Contractor will report the loss immediately to builders risk commercial insurer by calling 1-866-537-7475 and shall make such further written submissions as required and otherwise comply with all requirements of the builders risk policy.
  2. Contractor will report the loss immediately to the Owner.
  3. Contractor will immediately notify its general liability insurance carrier of the loss.
  4. Contractor will take all necessary and appropriate actions to protect the property and individuals from further loss, harm, and injury. In the event there are damages resulting from fire or water, restoration shall be performed only by a certified restoration contractor.
  5. To the extent possible, Contractor will preserve and not disturb the evidence of the loss until after the builders risk commercial insurer and all interested parties and their insurance carriers have had the opportunity to view and investigate the site and loss.
  6. Contractor will cooperate with Owner and the builders risk commercial insurer in the investigation, documentation, and settlement of loss claims, including without limitation promptly responding to all requests for information and documentation from the builders risk commercial insurer and/or Owner.

## **11.2 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND**

- A. Prior to commencement of the Work or within ten (10) days after signing the Agreement, whichever is earlier, Contractor will furnish to Owner a performance bond and a labor and material payment bond each in an amount equal to one hundred percent (100%) of the Contract Sum as security for all obligations arising under the Contract Documents. Such bonds will:
  1. Be written on Form AIA Document A312 (1984).
  2. Be issued by a surety company or companies licensed in the state in which the Project is located and holding valid certificates of authority under Sections 9304 to 9308, Title 31, of the United States Code as acceptable sureties or reinsurance companies on federal bonds.
  3. Have a penal sum obligation not exceeding the authorization shown in the current revision of Circular #570 as issued by the United States Treasury Department, i.e. "Treasury List".
  4. Be accompanied by a certified copy of the power of attorney stating the authority of the attorney-in-fact executing the bonds on behalf of the surety.
- B. Owner reserves the right to reject any surety company, performance bond, or labor and material payment bond with or without cause.
- C. The cost of the bonds as required above will be the obligation of Contractor.

## **SECTION 12 - UNCOVERING AND CORRECTION OF WORK**

### **12.1 UNCOVERING OF WORK**

Contractor will notify Architect at least twenty-four (24) hours in advance of performing work that would cover up work or otherwise make it difficult to perform inspections required by the Specifications or by applicable governing authorities. Should any such work be covered without proper notification having been given to Architect, Contractor will uncover that work for inspection at its own expense.

### **12.2 CORRECTION OF WORK**

- A. Contractor will promptly correct any portion of the Work that is rejected by Architect or which fails to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. Contractor will bear the cost of correcting such rejected Work, including additional testing and inspection costs, compensation for Architect's services, and any other expenses made necessary thereby.
- B. Contractor will remedy any defects due to faulty materials, equipment, or workmanship which appear within a period of one (1) year from the date of Substantial Completion or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents. Contractor will pay all costs of correcting faulty work, including without limitation additional Architect's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses when incurred.
- C. Nothing in the Contract Documents will be construed to establish a period of limitation within which Owner may enforce the obligation of Contractor to comply with the Contract Documents. The one-year period specified above has no relationship to the time within which compliance with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish Contractor's liability with respect to Contractor's obligations.

## **12.3 ACCEPTANCE OF NONCONFORMING WORK**

- A. If Owner prefers to accept any portion of the Work not in conformance with the Contract Documents, Owner may do so instead of requiring removal and correction of the nonconforming Work. In that event, the Contract Sum will be reduced by an amount agreed upon by the parties that reflects the difference in value to Owner between the Work as specified and the nonconforming Work. Such adjustment may consider increased maintenance costs, early replacement costs, increased inefficiency of use, and the like and will be effective whether or not final payment has been made. Such adjustment will be reflected in a Change Order pursuant to Section 7.5.
- B. Temporary or trial usage by Owner or Architect of mechanical devices, machinery, apparatus, equipment, or other work or materials supplied under the Contract Documents prior to written acceptance by Architect, will not constitute Owner's acceptance.

## **SECTION 13 - RESOLUTION OF DISPUTES**

### **13.1 SUBMITTAL OF DISPUTE**

In the event there is any dispute arising under this Agreement which cannot be resolved by agreement between the parties, either party may submit the dispute with all documentation upon which it relies to the Director of Architecture, Engineering, and Construction, Meetinghouse Facilities Department, 50 East North Temple, Salt Lake City, Utah 84150, who will convene a dispute resolution conference within thirty (30) days. The dispute resolution conference will constitute settlement negotiations and any settlement proposal made pursuant to the conference will not be admissible as evidence of liability. In the event that the parties do not resolve their dispute pursuant to the dispute resolution conference, either party may commence legal action to resolve the dispute. Any such action must be commenced within six (6) months from the first day of the dispute resolution conference or be time barred. Submission of the dispute to the Director as outlined above is a condition precedent to the right to commence legal action to resolve any dispute. In the event that either party commences legal action to adjudicate any dispute without first submitting the dispute to the Director, the other party will be entitled to obtain an order dismissing the litigation without prejudice and awarding such other party any costs and attorney fees incurred by that party in obtaining the dismissal, including without limitation copy costs, and expert and consultant fees and expenses.

### **13.2 CONTRACTOR TO PROCEED WITH DILIGENCE**

Pending final resolution of a dispute hereunder, Contractor will proceed diligently with the performance of its obligations under this Agreement.

## **SECTION 14 - TERMINATION**

### **14.1 TERMINATION BY CONTRACTOR**

In the event Owner materially breaches any term of the Contract Documents, Contractor will promptly give Written Notice of the breach to Owner. If Owner fails to cure the breach within ten (10) days of the Written Notice, Contractor may terminate the Agreement by giving Written Notice to Owner and recover from Owner the percentage of the Contract Sum represented by the Work completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation or damages as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations under section 3.14 as well as all warranties in the specifications relative to Work provided through the date of termination survive a termination hereunder.

### **14.2 TERMINATION BY OWNER FOR CAUSE**

Should Contractor fail to provide Owner with the bonds and certificates of insurance required by Section 11 within the time specified therein, make a general assignment for the benefit of its creditors, fail to apply enough properly skilled workmen or specified materials to properly prosecute the Work in accordance with Contractor's schedule, or otherwise materially breach any provision of the Contract Documents, then Owner may, without any prejudice to any other right or remedy, give Contractor Written Notice thereof. If Contractor fails to cure its default within ten (10) days, Owner may terminate the Agreement by giving Written Notice to Contractor. In such case, Owner may, in Owner's sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor and/or take possession of the premises and all materials, tools, equipment, and appliances thereon, and finish the Work by whatever method Owner deems expedient. Contractor will not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Sum exceeds the expense of finishing the Work, including compensation for additional administrative, architectural, consultant, and legal services (including without limitation attorney fees, expert fees, copy costs, and other expenses), such excess will be paid to Contractor. If such expense exceeds the unpaid balance, Contractor will pay the difference to Owner. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor's indemnities and obligations under section 3.14 as well as all warranties in the specifications relative to Work provided through the date of termination survive a termination hereunder.

### **14.3 TERMINATION BY OWNER FOR CONVENIENCE**

Notwithstanding any other provision contained in the Contract Documents, Owner may, without cause and in its absolute discretion, terminate the Agreement at any time. In the event of such termination, Contractor will be entitled to recover from Owner the

percentage of the Contract Sum equal to the percentage of the Work which Architect determines has been completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Owner may, in Owner's sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor. Without limitation, Contractor's indemnities and obligations under section 3.14 as well as all warranties in the specifications relative to Work provided through the date of termination survive a termination hereunder.

## **SECTION 15 - MISCELLANEOUS PROVISIONS**

### **15.1 GOVERNING LAW**

The parties acknowledge that the Contract Documents have substantial connections to the State of Utah. The Contract Documents will be deemed to have been made, executed, and delivered in Salt Lake City, Utah. To the maximum extent permitted by law, (i) the Contract Documents and all matters related to their creation and performance will be governed by and enforced in accordance with the laws of the State of Utah, excluding conflicts of law rules; and (ii) all disputes arising from or related to the Contract Documents will be decided only in a state or federal court located in Salt Lake City, Utah and not in any other court or state. Toward that end, the parties hereby consent to the jurisdiction of the state and federal courts located in Salt Lake City, Utah and waive any other venue to which they might be entitled by virtue of domicile, habitual residence, place of business, or otherwise.

### **15.2 NO WAIVER**

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

### **15.3 RULE OF CONSTRUCTION**

Owner and Contractor agree that the Contract Documents will be deemed to have been drafted by both Owner and Contractor and will not be construed against either Owner or Contractor because of authorship.

### **15.4 ENFORCEMENT**

In the event either party commences legal action to enforce or rescind any provision of the Contract Documents, the prevailing party will be entitled to recover its attorney fees and costs, including without limitation all copy costs and expert and consultant fees and expenses, incurred in that action and on all appeals, from the other party.

### **15.5 TESTS AND INSPECTIONS**

- A. Owner and Architect have the right to have tests made when they deem it necessary. Tests conducted by Owner or Architect will be paid for by Owner. Should a test reveal a failure of the Work to meet Contract Document requirements, the cost of the test as well as subsequent tests related to the failure necessary to determine compliance with the Contract Documents will be paid for by Owner, with the cost thereof deducted from the Contract Sum by Modification.
- B. Tests will be made in accordance with recognized standards by a competent, independent testing laboratory. Materials found defective or not in conformity with Contract Document requirements will be promptly replaced or repaired at the expense of Contractor.
- C. Owner and Architect have the right to obtain samples of materials to be used in the Work and to test samples for determining whether they meet Contract Document requirements. Samples required for testing will be furnished by Contractor and selected as directed by Architect. Samples may be required from the sample's source, point of manufacture, point of delivery, or point of installation at Architect's discretion. Samples not required as a Submittal in the Specifications will be paid for by Owner. Should tests reveal a failure of the Sample to meet the Contract Document requirements, Contractor will provide other Samples that comply with the requirements of the Contract Documents.

END OF DOCUMENT





# SUPPLEMENTARY CONDITIONS

## FIXED SUM (U.S.)

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### **ITEM 1 - GENERAL**

1. Conditions of the Agreement and General Conditions apply to each Division of the Specifications.
2. Provisions contained in Division 01 apply to all Divisions of the Specifications.

### **ITEM 2 - LIQUIDATED DAMAGE AMOUNTS:**

1. The amount of liquidated damages to the benefit of the Contractor for delays under General Conditions Section 7.3, Paragraph B is \$500.00 per day.
2. The amount of liquidated damages to the benefit of the Owner for delays in Substantial Completion of the Work under General Conditions Section 8.3, Paragraph A is \$500.00 per day.
3. The amount of liquidated damages to the benefit of the Owner for delays in completing work itemized on the Substantial Completion Certificate under General Conditions Section 8.3, Paragraph B is \$250.00 per day.

### **ITEM 3 - PERMITS**

1. Delete Section 3.6, Paragraph B of the General Conditions and replace with the following:
  - B. Contractor will obtain and Owner will pay for the building permit, and all other permits, governmental fees, licenses and inspections necessary for the proper execution and completion of the Work.

### **ITEM 4 - MISCELLANEOUS CHANGES IN GENERAL CONDITIONS**

1. FOR PROJECTS EXCEEDING \$5 MILLION – CONTRACTOR TO PROVIDE BUILDER'S RISK INSURANCE (AND NOT OWNER)

*Replace Section 11.1 Contractor's Liability Insurance of the General Conditions with the following:*

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

- A. Contractor will obtain the following insurance and provide evidence thereof as described below prior to commencement of the Work or within ten (10) days after signing the Agreement, whichever is earlier:
  1. Workers Compensation Insurance.
  2. Employers Liability Insurance with minimum limits of the greater of: \$500,000 E.L. each accident, \$500,000 E. L. disease-each employee, \$500,000 E.L. disease-policy limit; or as required by the law of the state in which the Project is located.
  3. Commercial General Liability Insurance – ISO Form CG 00 01 (12/07) or equivalent Occurrence policy which will provide primary coverage to the additional insureds (the Owner and the Architect) in the event of any Occurrence, Claim, or Suit with:
    - a. Limits of the greater of Contractor's actual coverage amounts or the following:
      - 1) \$2,000,000 General Aggregate;
      - 2) \$2,000,000 Products - Comp/Ops Aggregate;
      - 3) \$1,000,000 Personal and Advertising Injury;
      - 4) \$1,000,000 Each Occurrence;
      - 5) \$50,000 Damage to Rented Premises.
    - b. Endorsements attached to the General Liability policy including the following or their equivalent:
      - 1) ISO Form CG 25 03 (05/09), Designated Construction Project(s) General Aggregate Limit,

- describing the project and specifying that limits apply to each project of the contractor.
- 2) ISO Form CG 20 10 (07/04), Additional Insured – Owners, Lessees or Contractors – Scheduled Person or Organization, naming Owner and Architect as additional insureds.
4. Automobile Liability Insurance, with:
    - a. Combined Single Limit each accident in the amount of \$1,000,000 or Contractor's actual coverage, whichever is greater; and
    - b. Coverage applying to "Any Auto" or equivalent to all owned autos, hired autos, and non-owned autos.
  5. Builder's Risk Insurance Policy – ISO Form CP 00 20 (10/12), Builders Risk Coverage (or equivalent form) and ISO Form CP 10 30 (10/12) Causes of Loss – Special Form, and ISO Form CP 11 20 (06/07) Builders Risk – Collapse During Construction (or equivalent form) with Limits of Insurance in the amount of the Guaranteed Maximum Price.
    - a. Policy will cover materials stored at temporary storage locations and materials in transit.
    - b. Include Owner and Subcontractors as additional insureds.
    - c. Policy will be subject to a deductible of not less than \$5,000 per occurrence which will be the responsibility of Contractor and will not be included in the Cost of the Work or be a reimbursable expense.
- B. Contractor will provide evidence of such insurance to Owner as follows:
1. Deliver to Owner a Certificate of Insurance on ACORD 25 (2010/05) or equivalent:
    - a. Listing Owner as the Certificate Holder and Owner and Architect as Additional Insureds on general liability and any excess liability policies;
    - b. Attaching the endorsements set forth above for additional insured on general liability (CG 20 10 07/04) and Designated Construction Project Aggregate Limit (CG 25 03 05/09).
    - c. Identifying the Project.
    - d. Listing the insurance companies providing coverage. All companies must be rated in A.M. Best Company's Key Rating Guide – Property-Casualty, current edition, at a rating B+ Class VII or better. Companies that are not rated are not acceptable.
    - e. Bearing the name, address, and telephone number of the producer and signed by an authorized representative of the producer. The signature may be original, stamped, or electronic. A faxed or digital copy is also acceptable.
  2. Deliver to Owner a Certificate of Insurance on ACORD 27, Evidence of Property Insurance, for the Builders Risk Insurance Policy attaching the endorsement giving evidence that the Owner and all Subcontractors are listed as additional insureds on the Builders Risk Policy.
- C. Contractor will maintain, from commencement of the Work, Insurance coverage required herein as follows:
1. Commercial General Liability Insurance through expiration of warranty period specified in Section 12.2, Paragraph B. including completion of any warranty repairs;
  2. Builders' Risk Insurance through Substantial Completion; and
  3. All other insurance through final payment.
- D. In the event of a loss, or upon request by Owner, Contractor will provide Owner with a copy of required insurance policies above.
- E. Owner reserves the right to reject any insurance company, policy, endorsement, or certificate of insurance with or without cause.
- F. Owner may, in writing and at its sole discretion, modify the insurance requirements.

## **ITEM 5 - STATE SPECIFIC SUPPLEMENTARY CONDITIONS**

### **Utah**

#### **RETENTION APPLIED TO CONTRACTOR PAYMENTS FOR PROJECTS IN UTAH:**

*Replace section 9.5.F of the General Conditions with the following:*

- F. In addition and notwithstanding the foregoing, Owner may also withhold and retain 5% of payments made to Contractor. These retention funds will be held in an interest bearing account.

**PAYMENT OF RETAINED FUNDS IN UTAH:**

*Replace section 9.5 G of the General Conditions with the following:*

- G. After Contractor achieves Substantial Completion and submits its payment request for retained funds and delivers to the Architect Owner's form entitled "Contractor's Substantial Completion Affidavit and Consent of Surety" fully executed by Contractor and its surety, if any, and provides statutory Conditional Waiver and Release documents executed by all subcontractors and suppliers having claim against the retained funds, Owner will pay any unpaid retention less any amounts withheld pursuant to Section 9.4 within forty-five (45) days from the later of (a) the date Owner received Contractor's payment request for retained funds and fully executed Contractor's Substantial Completion Affidavit and Consent of Surety, (b) the date a certificate of occupancy is issued; (c) the date that a building inspector having authority to issue its own certificate of occupancy does not issue that certificate but permits occupancy.

**UTAH STATE SALES TAX:**

*Add the following to the General Conditions:*

1. Contractors should be exempt on purchases of material installed or converted into real property to be used by the Owner. The Contractor will furnish each vendor with a completed Exemption Certificate Form TC-721. The certificate will be prepared by the Contractor for each vendor in order to obtain the exemption.
2. The Owner's tax exempt number is 11871701-002-STC.

**UTAH NOTICE OF INTENT TO OBTAIN FINAL COMPLETION:**

*Add the following to the General Conditions:*

- A. Contractor shall file with the State Construction Registry, on its own behalf and/or on behalf of Owner, a notice of intent to obtain final completion at least 45 days before the day on which the Owner or Contractor files or could file a notice of completion under Utah Code Ann. Section 38-1a-506 if:
1. The completion of performance time under the original contract for construction work is greater than 120 days;
  2. The total original construction contract price exceeds \$500,000; and
  3. The original contractor or owner has not obtained a payment bond in accordance with Utah Code Ann. Section 14-2-1.

**UTAH NOTICE OF COMPLETION:**

*Add the following to the General Conditions:*

- A. Within five (5) calendar days of final completion of the Project and in compliance with Section 38-1a-507 Utah Code Annotated, Contractor shall file with the State Construction Registry, and copy to Owner, a notice of completion which shall include, without limitation, the following:
1. The name, address, telephone number, and email address of the person filing the notice of completion;
  2. The name of the county in which the Project and/or Project site is located;
  3. The date on which final completion is alleged to have occurred;
  4. The method used to determine final completion; and
  5. One of the following:
    - a. The tax parcel identification number of each parcel included in the Project and/or Project site;

- b. The entry number of a preliminary notice on the same project that includes the tax parcel identification number of each parcel included in the Project and/or Project site; or
    - c. The entry number of the building permit issued for the Project.
  - B. Notwithstanding any other provision of the Contract Documents to the contrary, Contractor and Owner agree that any breach or failure to comply with this Section by the Contractor will constitute a breach of contract and the Contractor will be liable for any direct, indirect, or consequential damages to the Owner flowing from this breach.

#### **UTAH PROGRESS PAYMENTS AND FINAL PAYMENT:**

*Replace Section 9.5.A of the General Conditions with the following:*

##### **9.5 PROGRESS PAYMENTS**

- A. Owner will pay Contractor progress payments within the parameters of Section 9.2 within fifteen (15) days after:
  1. Contractor has submitted a progress payment request;
  2. Contractor has obtained Conditional Waiver and Release Upon Progress Payment documents (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's progress payment request; and
  3. Owner receives the certified payment request from Architect.

*Replace Section 9.6.A.3 of the General Conditions with the following:*

##### **9.6 FINAL PAYMENT**

3. Contractor has obtained Waiver and Release Upon Final Payment documents (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's final payment request;

#### **ITEM 6 - AMOUNT FOR PERMITS AND FEES**

Include in the bid the sum of **\$5,000.00** to be used as the amount for permits and fees to Garfield County. Once the exact amount of permits and fees is known, the amount will be adjusted up or down by change order. The Owner will then receive a credit back or the Contractor will receive an extra.

END OF DOCUMENT

# DIVISION 01: GENERAL REQUIREMENTS

## 01 1000 SUMMARY

01 1100 SUMMARY OF WORK  
01 1400 WORK RESTRICTIONS

## 01 2000 PRICE AND PAYMENT PROCEDURES

01 2900 PAYMENT PROCEDURES

## 01 3000 ADMINISTRATIVE REQUIREMENTS

01 3100 PROJECT MANAGEMENT AND COORDINATION  
01 3200 CONSTRUCTION PROGRESS DOCUMENTATION  
01 3300 SUBMITTAL PROCEDURES  
01 3500 SPECIAL PROCEDURES

## 01 4000 QUALITY REQUIREMENTS

01 4000 QUALITY REQUIREMENTS  
01 4200 REFERENCES  
01 4301 QUALITY ASSURANCE - QUALIFICATIONS  
01 4523 TESTING AND INSPECTION SERVICES  
01 4546 DUCT TESTING, ADJUSTING, AND BALANCING

## 01 5000 TEMPORARY FACILITIES AND CONTROLS

01 5100 TEMPORARY UTILITIES  
01 5200 CONSTRUCTION FACILITIES  
01 5400 CONSTRUCTION AIDS  
01 5600 TEMPORARY BARRIERS AND ENCLOSURES  
01 5700 TEMPORARY CONTROLS  
01 5800 PROJECT IDENTIFICATION

## 01 6000 PRODUCT REQUIREMENTS

01 6100 COMMON PRODUCT REQUIREMENTS  
01 6200 PRODUCT OPTIONS  
01 6600 PRODUCT DELIVERY, STORAGE, AND HANDLING REQUIREMENTS

## 01 7000 EXECUTION AND CLOSEOUT REQUIREMENTS

01 7300 EXECUTION  
01 7400 CLEANING AND WASTE MANAGEMENT  
01 7700 CLOSEOUT PROCEDURES  
01 7800 CLOSEOUT SUBMITTALS

END OF TABLE OF CONTENTS

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**SECTION 01 1100**

**SUMMARY OF WORK**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements Summary of Work requirements.

**1.2 WORK COVERED BY CONTRACT DOCUMENTS**

- A. Provisions contained in Division 01 apply to Sections of Divisions 02 through 49 of Specifications. Instructions contained in Specifications are directed to Contractor. Unless specifically provided otherwise, obligations set forth in Contract Documents are obligations of Contractor.
- B. Contractor shall furnish total labor, materials, equipment, and services necessary to perform The Work in accordance with Contract Documents.

**1.3 WORK BY OWNER**

- A. Owner will furnish and install some portions of The Work with its own forces. Contractor will be provided with schedule of when these items are to be performed.
  - 1. General:
    - a. Complete work necessary to accommodate work to be performed by Owner before scheduled date for performance of such work. Contractor will be back charged for actual expenses incurred by Owner for failure to timely complete such work.
    - b. Store and protect completed work provided by Owner until date of Substantial Completion.
  - 2. Work furnished and installed by Owner include, but are not limited to, following:
    - a. High Security Cylinders and Cores:

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

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**SECTION 01 1400**  
**WORK RESTRICTIONS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Work Restrictions.

**1.2 PROJECT CONDITIONS**

- A. During construction period, Contractor will have use of premises for construction operations. Contractor will ensure that Contractor, its employees, subcontractors, and their employees comply with following requirements:
  - 1. Confine operations to areas within Contract limits shown on Drawings. Do not disturb portions of site beyond Contract limits.
  - 2. Do not allow alcoholic beverages, illegal drugs, or persons under their influence on Project site.
  - 3. Do not allow use of tobacco in any form on Project Site.
  - 4. Do not allow pornographic or other indecent materials on site.
  - 5. Do not allow work on Project site on Sundays except for emergency work.
  - 6. Refrain from using profanity or being discourteous or uncivil to others on Project Site or while performing The Work.
  - 7. Wear shirts with sleeves, wear shoes, and refrain from wearing immodest, offensive, or obnoxious clothing, while on Project Site.
  - 8. Do not allow playing of obnoxious and loud music on Project Site. Do not allow playing of any music within existing facilities.
  - 9. Do not build fires on Project Site.
  - 10. Do not allow weapons on Project Site, except those carried by law enforcement officers or other uniformed security personnel who have been retained by Owner or Contractor to provide security services.
- B. Existing Facilities:
  - 1. Reasonably accommodate use of existing facilities by Owner.
- C. Do not load or permit any part of the structure to be loaded with a weight that will endanger its safety. Questions of structural loading as part of construction means and methods shall be addressed by a licensed structural engineer engaged by Contractor, subject to the review by Architect.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

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**SECTION 01 2900**  
**PAYMENT PROCEDURES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements to prepare and process Applications for Payments.

**1.2 PAYMENT REQUESTS**

- A. Use Payment Request forms provided by Owner.
- B. Each Payment Request will be consistent with previous requests and payments certified by Architect and paid for by Owner.
- C. Request Preparation:
  - 1. Complete every entry on Payment Request form.
  - 2. Entries will match data on approved schedule of values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
  - 3. Submit signed Payment Request to Architect with current Construction Schedule.
- D. Provide following submittals before or with submittal of Initial Payment Request:
  - 1. List of Subcontractors.
  - 2. Initial progress report.
  - 3. Contractor's Construction Schedule.
  - 4. Submittal Schedule.
- E. Provide Affidavit of Contractor and Consent of Surety with Payment Request following Substantial Completion.

**1.3 SCHEDULE OF VALUES**

- A. Submit schedule of values on Owner's standard form to Architect 20 days minimum before submission of Initial Payment Request as a necessary condition before payment will be processed. Coordinate preparation of schedule of values with preparation of Contractor's Construction Schedule. Correlate line items in Schedule of Values with other required administrative schedules and forms, including:
  - 1. Contractor's Construction Schedule.
  - 2. Payment Request form.
  - 3. Schedule of Alternates.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

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**SECTION 01 3100****PROJECT MANAGEMENT AND COORDINATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Project Management and Coordination on Projects.

**1.2 PROJECT COORDINATION**

- A. This Project designation will be included on documents generated for Project by Contractor and Subcontractors, or be present on a cover letter accompanying such documents.
- B. Project designation for this Project is **LDS 503-8197-20010101, Escalante UT Stake.**
- C. This Project designation will be included on documents generated for Project by Contractor and Subcontractors, or be present on a cover letter accompanying such documents.

**1.3 MULTIPLE CONTRACT COORDINATION**

- A. Contractor shall be responsible for accurately maintaining and reporting schedule of The Work from Notice to Proceed to date of Substantial Completion.
- B. Contractor shall be responsible for providing Temporary Facilities And Controls for those who perform work on Project from Notice to Proceed to date of Substantial Completion.
- C. Contractor shall be responsible for providing Construction Waste Management And Disposal services for those who perform work on Project from Notice to Proceed to date of Substantial Completion.
- D. Contractor shall be responsible for Final Cleaning for entire Project.

**1.4 PROJECT MEETINGS AND CONFERENCES**

- A. Preconstruction Conference:
  - 1. Attend preconstruction conference and organizational meeting scheduled by Architect at Project site or other convenient location.
  - 2. Be prepared to discuss items of significance that could affect progress, including such topics as:
    - a. Construction schedule.
    - b. Critical Work sequencing.
    - c. Current problems.
    - d. Designation of responsible personnel.
    - e. Distribution of Contract Documents.
    - f. Equipment deliveries and priorities.
    - g. General schedule of inspections by Architect and its consultants.
    - h. General inspection of tests.
    - i. Office, work, and storage areas.
    - j. Preparation of record documents and O & M manuals.
    - k. Procedures for processing interpretations and Modifications.
    - l. Procedures for processing Payment Requests.

- m. Project cleanup.
  - n. Security.
  - o. Status of permits.
  - p. Submittal of Product Data, Shop Drawings, Samples, Quality Assurance / Control submittals.
  - q. Use of the premises.
  - r. Work restrictions.
  - s. Working hours.
3. Architect will record minutes of meetings and distribute copies to Owner and Contractor within three (3) working days.
- B. Progress Meetings:
1. Attend progress meetings at Project site at regularly scheduled intervals determined by Architect, at least once a month.
  2. Progress meetings will be open to Owner, Architect, Subcontractors, and anyone invited by Owner, Architect, and Contractor.
  3. Be prepared to discuss items of significance that could affect progress, including following:
    - a. Progress since last meeting.
    - b. Whether Contractor is on schedule.
    - c. Activities required to complete Project within Contract Time.
    - d. Labor and materials provided under separate contracts.
    - e. Off-site fabrication problems.
    - f. Access.
    - g. Site use.
    - h. Temporary facilities and services.
    - i. Hours of work.
    - j. Hazards and risks.
    - k. Project cleanup.
    - l. Quality and Work standards.
    - m. Status of pending modifications.
    - n. Documentation of information for Payment Requests.
    - o. Maintenance of Project records.
  4. Architect will prepare minutes of progress meetings and distribute copies of minutes to Owner and Contractor within three (3) working days.
- C. Pre-Installation Conferences:
1. Attend pre-installation conferences specified in Contract Document.
    - a. If possible, schedule these conferences on same day as regularly scheduled Progress Meetings. If this is not possible, coordinate scheduling with Architect.
    - b. Request input from attendees in preparing agenda.
  2. Be prepared to discuss following items:
    - a. Requirements of Contract Documents.
    - b. Completed work necessary for installation of items or systems.
    - c. Conditions not in compliance with installation requirements.
    - d. Installation and inspection schedule.
    - e. Coordination between trades.
    - f. Space and access limitations.
    - g. Testing.
  3. Architect will prepare meeting minutes and distribute minutes to Owner and Contractor within three (3) working days.

## **PART 2 - PRODUCTS Not Used**

## **PART 3 - EXECUTION Not Used**

**END OF SECTION**

**SECTION 01 3200****CONSTRUCTION PROGRESS DOCUMENTATION****PART 1 - GENERAL****1.1 SUMMARY**

## A. Section Includes But is Not Limited To:

1. Administrative and procedural requirements for documenting the progress of construction during performance of the Work.

**1.2 SCHEDULING OF WORK**

## A. Bar Chart Schedule:

1. Submit horizontal bar chart schedule before Preconstruction Conference. Provide separate time bar for each construction activity listed on Owner's payment request form. Within each time bar, show estimated completion percentage. Provide continuous vertical line to identify first working day of each week. Show each activity in chronological sequence. Show graphically sequences necessary for completion of related portions of The Work. As The Work progresses, place contrasting mark in each bar to indicate actual completion.
2. Provide copies of schedule for Architect and Owner and post copy in field office.
3. Revise schedule monthly. Send copy of revised schedule to Owner and Architect and post copy in field office.
4. Project Management Software Programs:
  - a. Any software project management program capable of Bar Chart Scheduling for projects of equal size and complexity is approved by Contractor and approved by Owner's Project Manager.

## B. Daily Construction Reports:

1. Prepare daily reports of operations at Project including at least following information:
  - a. List of Subcontractors at site.
  - b. Approximate count of personnel at site by trade.
  - c. High and low temperatures, general weather conditions.
  - d. Major items of equipment on site.
  - e. Materials, equipment, or Owner-furnished items arriving at or leaving site.
  - f. Accidents and unusual events.
  - g. Site or structure damage by water, frost, wind, or other causes.
  - h. Meetings, conferences, and significant decisions.
  - i. Visitors to the job including meeting attendees.
  - j. Stoppages, delays, shortages, losses.
  - k. Any tests made and their result if known.
  - l. Meter readings and similar recordings.
  - m. Emergency procedures.
  - n. Orders and requests of governing authorities.
  - o. Modifications received, carried out.
  - p. Services connected, disconnected.
  - q. Equipment or system tests and start-ups.
  - r. Brief summary of work accomplished that day.
  - s. Signature of person preparing report.
2. Submit daily reports to Architect at least weekly.
3. Maintain copies of daily reports at field office.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**



**SECTION 01 3300****SUBMITTAL PROCEDURES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Submittal Procedures.
- B. Related Requirements:
  - 1. Section 01 7800: 'Closeout Submittals' for administrative and procedural requirements for closeout submittals.

**1.2 SUBMITTAL SCHEDULE**

- A. Furnish submittal schedule within 20 days after receipt of Notice to Proceed, listing items specified to be furnished for review to Architect including product data, shop drawings, samples, and Informational submittals.
  - 1. Coordinate submittal schedule with Contractor's construction schedule.
  - 2. Enclose the following information for each item:
    - a. Scheduled date for first submittal.
    - b. Related Section number.
    - c. Submittal category.
    - d. Name of Subcontractor.
    - e. Description of part of the Work covered.
    - f. Scheduled date for resubmittal.
    - g. Scheduled date for Architect's final release or approval.
- B. Print and distribute copies to Architect and Owner and post copy in field office. When revisions are made, distribute to same parties and post in same location.
- C. Revise schedule monthly. Send copy of revised schedule to Owner and Architect and post copy in field office.

**1.3 SUBMITTAL PROCEDURES**

- A. Coordination:
  - 1. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently before performance of related construction activities to avoid delay.
    - a. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
    - b. Coordinate transmittal of different types of submittals required for related elements of The Work so processing will not be delayed by need to review submittals concurrently for coordination. Architect reserves right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
  - 2. Processing Time:
    - a. Allow sufficient review time so installation will not be delayed by time required to process submittals, including time for resubmittals.
      - 1) Allow 14 days for initial review. Allow additional time if processing must be delayed allowing coordination with subsequent submittals. Architect will promptly advise Contractor when submittal being processed must be delayed for coordination.

- 2) If an intermediate submittal is necessary, process same as initial submittal.
  - 3) Allow 7 days for reprocessing each submittal.
  - 4) No extension of Contract Time will be authorized because of failure to transmit submittals to Architect in sufficient time before work is to be performed to allow processing.
3. Identification:
- a. Place permanent label or title block on each submittal for identification. Include name of entity that prepared each submittal on label or title block.
    - 1) Provide space approximately 4 by 5 inches on label or beside title block on Shop Drawings to record Contractor's review and approval markings and action taken.
    - 2) Include following information on label for processing and recording action taken:
      - a) Project name.
      - b) Date.
      - c) Name and address of Architect.
      - d) Name and address of Contractor.
      - e) Name and address of Subcontractor.
      - f) Name and address of supplier.
      - g) Name of manufacturer.
      - h) Number and title of appropriate Specification Section.
      - i) Drawing number and detail references, as appropriate.
4. Transmittal:
- a. Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using transmittal letter. On transmittal, record relevant information and requests for data. Include Contractor's certification that information complies with Contract Document requirements, or, on form or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations.
  - b. Submittals received from sources other than Contractor or not marked with Contractor's approval will be returned without action.

#### 1.4 ACTION SUBMITTALS

- A. Product Data:
1. Submit Product Data, as required by individual Sections of Specifications.
  2. Mark each copy of each set of submittals to show choices and options used on Project. Where printed Product Data includes information on products that are not required for Project, mark copies to indicate information relating to Project.
  3. Certify that proposed product complies with requirements of Contract Documents. List any deviations from those requirements on form or separate sheet.
  4. Submit five copies of each required submittal unless otherwise required. Architect will return three copies marked with action taken and with corrections or modifications required.
  5. Submit electronic files PDF: Architect will return a PDF copy marked with action taken and with corrections or modifications required.
- B. Shop Drawings:
1. Submit newly prepared graphic data to accurate scale. Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 36 by 48 inches (915 by 1 200 mm). Highlight, encircle, or otherwise show deviations from Contract Documents. Include following information as a minimum:
    - a. Dimensions.
    - b. Identification of products and materials included.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
  2. Do not reproduce Contract Documents or copy standard information as basis of Shop Drawings. Standard printed information prepared without specific reference to Project is not acceptable as Shop Drawings.
  3. Review and designate (stamp) approval of shop drawings. Unless otherwise specified, submit to Architect six copies of shop drawings required by Contract Documents. Shop drawings not

required by Contract Documents, but requested by Contractor or supplied by Subcontractor, need not be submitted to Architect for review.

C. Samples:

1. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
  - a. Mount, display, or package Samples to ease review of qualities specified. Prepare Samples to match samples provided by Architect, if applicable. Include following:
    - 1) Generic description of Sample.
    - 2) Sample source.
    - 3) Product name or name of manufacturer.
    - 4) Compliance with recognized standards.
    - 5) Availability and delivery time.
2. Submit Samples for review of kind, color, pattern, and texture, for final check of these characteristics with other elements, and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
  - a. Where variations in color, pattern, texture or other characteristics are inherent in material or product represented, submit set of three samples minimum that show approximate limits of variations.
  - b. Refer to other specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
  - c. Refer to other Sections for Samples to be returned to Contractor for incorporation into The Work. Such Samples shall be undamaged at time of use. On transmittal, indicate special requests regarding disposition of Sample submittals.
3. Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit full set of choices for material or product. Preliminary submittals will be reviewed and returned with Architect's mark indicating selection and other action.
4. Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit three sets. One will be returned marked with action taken.
5. Samples, as accepted and returned by Architect, will be used for quality comparisons throughout course of construction.
  - a. Unless noncompliance with Contract Documents is observed, submittal may serve as final submittal.
  - b. Sample sets may be used to obtain final acceptance of construction associated with each set.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Informational submittals are design data, test reports, certificates, manufacturer's instructions, manufacturer's field reports, and other documentary data affirming quality of products and installations. Submit five copies of each required submittal unless otherwise required. Architect will return three copies marked with action taken and with corrections or modifications required. [or] Submit electronic files: PDF. Architect will return a PDF copy marked with action taken and with corrections or modifications required.
1. Certificates: Describe certificates intended to document affirmations by Contractor or others that the work is in accordance with the Contract Documents, but do not repeat provisions of Parts 2 or 3.
  2. Delegated Design Submittals / Design Data: Describe submittals intended to demonstrate design work prepared by Contractor's licensed professionals.
  3. Test And Evaluation Reports: Describe submittal of test reports or evaluation service reports intended to document required tests.
  4. Manufacturer Instructions: Describe submittals intended to document manufacturer instructions.
  5. Source Quality Control Submittals: Describe submittal of source quality control documentation.
  6. Field Quality Control Submittals: Describe submittal of field quality control documentation.

7. Manufacturer Reports: Describe submittal of Manufacturer reports as documentation of manufacturer activities.
8. Special Procedure Submittals: Describe submittals intended to document special procedures. An example would be construction staging or phasing for remodeling an existing facility while keeping it in operation. While the Contractor would normally be responsible for managing this, submittal of his plan as documentation could be specified.
9. Qualification Statements: Describe submittals intended to document qualifications of entities employed by Contractor.

## 1.6 CLOSEOUT SUBMITTALS

- A. This title groups submittals that occur during project closeout. Coordinate with section 01 7800 Closeout Submittals.
  1. As Built Record Drawings as defined in the Agreement.
  2. Project Manual: Complete Project Manual including Addenda and Modifications as defined in General Conditions.
  3. Maintenance Contracts: Describe submittal of the maintenance contract specific to the Section.
  4. Operations & Maintenance Data: Describe submittal of operation and maintenance data necessary for products of the Section.
  5. Warranty Documentation: Describe submittal of final executed warranty document specific to the Section.
  6. Record Documentation: Describe submittal of record documentation specific to the Section.
  7. Software: Describe submittal system software and programming software specific to the Section.

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. This title groups maintenance material required submittals specific to the Section. Items may be provided at completion of Work or submitted with section 01 7800 Closeout Submittals:
  1. Spare Parts: Describe spare parts necessary for Owner's use in facility operation and maintenance. 'Parts' are generally understood to be items such as filters, motor drive belts, lamps, and other similar manufactured items that require only simple replacement.
  2. Extra Stock Materials: Describe extra stock materials to be provided for Owner's use in facility operation and maintenance. Extra stock materials are generally understood to be items such as ceiling tiles, flooring, paint etc.
  3. Tools:
    - a. Describe tools to be provided for Owner's use in facility operation and maintenance. Tools are generally understood to be wrenches, gauges, circuit setters, etc, required for proper operation or maintenance of a system.

## PART 2 - PRODUCTS Not Used

## PART 3 - EXECUTION Not Used

**END OF SECTION**

**SECTION 01 3500****SPECIAL PROCEDURES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
1. Administrative and procedural requirements for Special Procedures.

**1.2 REFERENCES**

- A. Association Publications:
1. U.S. Department of Labor, Occupational Safety and Health Administration:
    - a. 29 CFR 1926 OSHA, 'Construction Industry Regulations' (January 2014 or latest version).
      - 1) 29 CFR 1926.20, 'General Safety And Health Provisions'.
      - 2) 29 CFR 1926.64, 'Hot Work Permit'.
      - 3) 29 CFR 1926.352, 'Fire Prevention'.
      - 4) 29 CFR 1926.500, 'Fall Protection'.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Acceleration of Work:
1. Complete The Work in accordance with Construction Schedule. If Contractor falls behind schedule, take such actions as are necessary, at no additional expense to Owner, to bring progress of The Work back in accordance with schedule.
  2. Owner may request proposal for completion of The Work at date earlier than expiration of Contract Time:
    - a. Promptly provide requested proposal showing cost of such acceleration of The Work. Consult with Owner and Architect regarding possible options to decrease cost of such acceleration.
    - b. If Owner determines to order acceleration of The Work, change in Contract Sum and Contract Time resulting from acceleration will be included in a Change Order.

**1.4 QUALITY ASSURANCE**

- A. Regulatory Agency Sustainability Approvals:
1. Meet regulations of 29 CFR 1926 OSHA, 'Construction Industry Regulations'.
  2. Owner's Safety Requirements:
    - a. Personal Protection:
      - 1) Contractor shall ensure:
        - a) Positive means of fall protection, such as guardrails system, safety net system, personal fall arrest system, etc, is provided to employees whenever exposed to a fall 6 feet (1.80 m) or more above a lower level.
        - b) Personnel working on Project shall wear hard hats and safety glasses as required by regulation and hazard.
        - c) Personnel working on Project shall wear long or short sleeve shirts, long pants, and hard-toed boots or other sturdy shoes appropriate to type and phase of work being performed.
    - b. Contractor Tools And Equipment:
      - 1) Contractor shall ensure:

- a) Tools and equipment are in good working condition, well maintained, and have necessary guards in place.
  - b) Ground Fault Circuit Interrupters (GFCI) is utilized on power cords and tools.
  - c) Scaffolding and man lifts are in good working condition, erected and maintained as required by governmental regulations.
  - d) Ladders are in good condition, well maintained, used as specified by Manufacturer, and secured as required.
- c. Miscellaneous:
- 1) Contractor shall ensure:
    - a) Protection is provided on protruding rebar and other similar objects.
    - b) General Contractor Superintendent has completed the OSHA 10-hour construction outreach training course or equivalent.
    - c) Implementation and administration of safety program on Project.
    - d) Material Safety Data Sheets (MSDS) are provided for substances or materials for which an MSDS is required by governmental regulations before bringing on site.
    - e) Consistent safety training is provided to employees on Project.
    - f) Implement and coordinate Lockout / Tagout procedures with Owner's Representative as required.
  - 2) Report accidents involving injury to employees on Project that require off-site medical treatment to Owner's designated representative.
- d. Hot Work Permit:
- 1) Permit shall document that fire prevention and protection requirements in 29 CFR 1926.352, 'Fire Prevention' have been implemented prior to beginning hot work operations.
  - 2) Required for doing hot work involving open flames or producing heat or sparks such as:
    - a) Brazing.
    - b) Cutting.
    - c) Grinding.
    - d) Soldering.
    - e) Thawing pipe.
    - f) Torch applied roofing.
    - g) Welding.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

**SECTION 01 4000****QUALITY REQUIREMENTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes administrative & procedural requirements for quality assurance & quality control.
- B. Related Requirements:
  - 1. Section 01 3100: 'Project Management and Coordination' for Pre-Installation Conferences for testing and inspection.
  - 2. Section 01 3200: 'Construction Progress Documentation' for developing a schedule of required tests and inspections.
  - 3. Section 01 3300: 'Submittal Procedures'.
  - 4. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
  - 5. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
  - 6. Section 01 7300: 'Executions' for cutting and patching for repair and restoration of construction disturbed by testing and inspecting activities.
  - 7. Divisions 01 thru 49 establish responsibility for providing specific testing and inspections.

**1.3 REFERENCES**

- A. Definitions:
  - 1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
  - 2. Approved: To authorize, endorse, validate, confirm, or agree to.
  - 3. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with requirements indicated; and having complied with requirements of authorities having jurisdiction.
  - 4. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a construction operation, including installation, erection, application, and similar operations.
    - a. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of corresponding generic name.
  - 5. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish standard by which the Work will be judged.
  - 6. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant

- construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
7. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
  8. Product Testing: Tests and inspections that are performed by testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
  9. Service Provider: Agency or firm qualified to perform required tests and inspections.
  10. Source Quality Control Testing: Tests and inspections that are performed at source, i.e., plant, mill, factory, or shop.
  11. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
  12. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
  13. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.

B. Reference Standards:

1. International Code Council (IBC) (2015 or most recent edition adopted by AHJ):
  - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.

#### 1.4 ADMINISTRATIVE REQUIREMENTS

A. Conflicting Requirements:

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

B. Coordination:

1. Coordinate sequence of activities to accommodate required quality assurance and quality control services with minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

C. Scheduling:

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

#### 1.5 QUALITY ASSURANCE

A. Testing and inspecting services are used to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.

1. Specific quality assurance and quality control requirements for individual construction activities are specified in Sections that specify those activities and Section 01 4523. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality control procedures that facilitate compliance with Contract Document requirements.



3. Requirements for Contractor to provide quality assurance and quality control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- B. Quality Assurance Services:
1. Activities, actions, and procedures performed before and during execution of the Work to verify compliance and guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
  2. Owner or Owner's designated representative(s) will perform quality assurance to verify compliance with Contract Documents.
- C. Activities performed by Owner's Quality Assurance Testing Agency include, but are not limited to following:
1. Individual Sections in Division 01 through Division 49:
    - a. Pre-Installation Conference agenda review items for:
      - 1) Schedule requirements.
      - 2) Testing and inspection requirements:
      - 3) Requirements and frequency of testing and inspections.
      - 4) Mock-up or sample requirements.
      - 5) Submittals requirements.
    - b. Quality Assurance personal qualifications.
      - 1) Qualification documentation including certificates if required.
    - c. Non-Conforming Work:
      - 1) Prepare non-compliance log to track non-compliant testing or inspections.
  2. Weekly Activities:
    - a. Summarize and track any non-compliance issues.
    - b. Provide summary report of previous week's performed Work.
    - c. Visit contractors periodically to find out if they have any concerns with Quality Assurance inspectors and check on any schedule changes.
    - d. Visit Owner's Representatives periodically to find out if they have any concerns with how project is progressing.
- D. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with following requirements, using materials indicated for completed Work:
1. Coordinate with individual section in Division 01 through Division 49 if there are any additional requirements or modification to these requirements:
    - a. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
    - b. Notify Architect seven days in advance of dates and times when mockups will be constructed.
    - c. Demonstrate proposed range of aesthetic effects and workmanship.
    - d. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
      - 1) Allow seven days for initial review and each re-review of each mockup.
    - e. Maintain mockups during construction in undisturbed condition as standard for judging completed Work.
      - 1) Demolish and remove mockups when directed, unless otherwise indicated.

## 1.6 QUALITY CONTROL

- A. Quality Control Services:
1. Quality Control will be sole responsibility of Contractor.
    - a. Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements performed by Contractor:
      - 1) They do not include inspections, tests or related actions performed by Architect, Owner, governing authorities or independent agencies hired by Owner or Architect.
      - 2) Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
    - b. Where services are indicated as Contractor's responsibility, engage a qualified Testing Agency to perform these quality control services.

- 1) Contractor shall not employ same testing entity engaged by Owner, without Owner's written approval.
- B. Manufacturer's Field Services: Where indicated, engage factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 3300: 'Submittal Procedures'.
- C. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify Testing Agency sufficiently in advance of operations to permit assignment of personnel. Provide following:
1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist Testing Agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require quality control by Testing Agency.
  7. Security and protection for samples and for testing and inspecting equipment at Project site.
- D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections:
1. Civil And Structural Testing:
    - a. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in Section 01 4523 'Testing And Inspection Services'. Quality Control is sole responsibility of Contractor:
      - 1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
        - a) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.
      - 2) Provide summary reports of performed Work.
    - b. Weekly Activities:
      - 1) Ensure that non-compliance log is current.
      - 2) Provide summary reports of performed Work.

## **PART 2 - PRODUCTS Not Used**

## **PART 3 - EXECUTION**

### **3.1 REPAIR AND PROTECTION**

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
  2. Comply with Contract Document requirements for Section 01 7300 'Execution' for cutting and patching.
- B. Protect construction exposed by or for Quality Assurance and Quality Control activities.
- C. Repair and protection are Contractor's responsibility, regardless of assignment of responsibility for Quality Assurance and Quality Control Services.

**END OF SECTION**

**SECTION 01 4200****REFERENCES****PART 1 - GENERAL****1.1 SUMMARY**

## A. Section Includes But is Not Limited To:

1. Reference standards, definitions, specification format, and industry standards.

**1.2 REFERENCES**

## A. Definitions:

1. Approved: The term "approved," when used to convey Architect's action on Contractor's submittals, applications, and requests, is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
2. Directed: The term "directed" is a command or instruction by Architect. Other terms including "requested," "authorized," "selected," "approved," and "permitted" have the same meaning as "directed."
3. Experienced: The term "experienced," when used with an entity, means having successfully completed a minimum often previous projects similar in size and scope to this Project; being familiar with the special requirements indicated, and having complied with requirements of authority having jurisdiction.
4. Furnish: The term "furnish" means supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
5. General: Basic Contract definitions are included in the Conditions of the Contract.
6. Indicated: The term "indicated" refers to requirements expressed by graphic representations, or in written form on Drawings, in Specifications, and in other Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.
7. Install: The term "install" describes operations at Project site including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
8. Installer: An "Installer" is the Contractor, or another entity engaged by the Contractor, as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
9. Project Site: The term "Project site" means the space available for performing construction activities. The extent of the Project site is shown on the Drawings and mayor may not be identical with the description of the land on which the Project is to be built.
10. Provide: The term "provide" means to furnish and install, complete and ready for the intended use.
11. Regulations: The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
12. Submitted: The terms "submitted," "reported," "satisfactory" and similar words and phrases means submitted to Architect, reported to Architect and similar phrases.
13. Testing Agencies: A "testing agency" is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, or to report on and, if required, to interpret results of those inspections or tests.
14. Trades: Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.

## B. References Standards:

1. Specification Format: Specifications will follow MasterFormat™ 2004 for organizing numbers and titles. (The Construction Specifications Institute, Project Resource Manual/CSI Manual of Practice, 5<sup>th</sup> Edition. New York, McGraw-Hill, 2005).
  - a. Specification Identifications:
    - 1) The Specifications use section numbers and titles to help cross referencing in the Contract Documents.
    - 2) Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.
  - b. Specification Language:
    - 1) Specifications should be prepared, with concern and respect for their legal status. Specifications should be Clear, Concise, Correct and Complete.
    - 2) Streamlining: Streamlining is used to list products, materials, reference standards, and other itemized specifications. This technique places the subject first and provides keywords for quick reference
  - c. Sentence Structure:
    - 1) Specifications to be written in the “Imperative Mood”.
      - a) The verb that clearly defines the action becomes the first word in the sentence.
      - b) The imperative sentence is concise and readily understandable.
    - 2) Streamlining is used to list products, materials, reference standards, and other itemized specifications. This technique places the subject first and provides keywords for quick reference.
  - d. Abbreviated Language:
    - 1) Abbreviations should be used only on drawings and schedules where space is limited.
    - 2) Abbreviations with multiple meanings should be avoided, unless used in different disciplines where their meaning is clear from the context in which they are used.
    - 3) Abbreviations should be limited to five or fewer letters
      - a) The verb that clearly defines the action becomes the first word in the sentence.
  - e. Symbols:
    - 1) Caution should apply to symbols substituted for words or terms.
  - f. Numbers:
    - 1) The use of Arabic numerals rather than words for numbers is recommended.

C. Industry Standards:

1. Except where Contract Documents specify otherwise, construction industry standards will apply and are made a part of Contract Documents by reference.
2. Where compliance with two or more standards is specified and standards apparently establish different or conflicting requirements for minimum quantities or quality levels, refer to Architect for decision before proceeding. Quantity or quality level shown or specified will be minimum provided or performed. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for context of requirements. Refer uncertainties to Architect for decision before proceeding.
3. Each entity engaged in construction on Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with Contract Documents. Where copies of standards are needed for performance of a required construction activity, Contractor will obtain copies directly from publication source.
4. Trade Association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean association names. Names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up to date as of date of Contract Documents.

AABC	Associated Air Balance Council	Washington	DC	(202) 737-0202	<a href="http://www.aabchq.com">www.aabchq.com</a>
AAMA	American Architectural Manufacturers Association	Schaumburg	IL	(847) 303-5664	<a href="http://www.aamanet.org">www.aamanet.org</a>
AASHTO	American Association of State Highway & Transportation Officials	Washington	DC	(202) 624-5800	<a href="http://www.aashto.org">www.aashto.org</a>

AAMA	American Architectural Manufacturers Association	Schamamburg	IL	(847) 303-5774	<a href="http://www.aamanet.org">www.aamanet.org</a>
AASHTO	American association of State Highways and Transportation Officials	Washington	DC		<a href="http://www.transportation.org">www.transportation.org</a> <a href="http://www.aashto.org">www.aashto.org</a>
ACI	American Concrete Institute International	Farmington Hills	MI	(248) 848-3700	<a href="http://www.aci-int.org">www.aci-int.org</a>
AGA	American Gas Association	Washington	DC	(202) 824-7000	<a href="http://www.aga.org">www.aga.org</a>
AHRI	Air Conditioning Heating & Refrigeration Institute	Arlington	VA	(703) 524-8800	<a href="http://www.ari.org">www.ari.org</a>
AIA	American Institution of Architects	Washington	DC	(202) 626-7300	<a href="http://www.aia.org">www.aia.org</a>
AISC	American Institute of Steel Construction	Chicago	IL	(312) 670-2400	<a href="http://www.aisc.org">www.aisc.org</a>
AISI	American Iron & Steel Institute	Washington	DC	(202) 452-7100	<a href="http://www.steel.org">www.steel.org</a>
AITC	American Institution of Timber Construction	Englewood	CO	(303) 792-9559	<a href="http://www.aitc-glulam.org">www.aitc-glulam.org</a>
AMCA	Air Movement & Control Association International	Arlington Heights	IL	(847) 394-0150	<a href="http://www.amca.org">www.amca.org</a>
ANSI	American National Standards Institute	New York	NY	(212) 642-4900	<a href="http://www.ansi.org">www.ansi.org</a>
APA	APA-Engineered Wood Association	Tacoma	WA	(253) 565-6600	<a href="http://www.apawood.org">www.apawood.org</a>
API	American Petroleum Institute	Washington	DC	(202) 682-8000	<a href="http://www.api.org">www.api.org</a>
AQMD	South Coast Air Quality Management District	Diamond Bar	CA	(909) 396-2000	<a href="http://www.aqmd.gov">www.aqmd.gov</a>
ASHRAE	American Society of Heating, Refrigerating, & Air-Conditioning Engineers	Atlanta	GA	(404) 636-8400	<a href="http://www.ashrae.org">www.ashrae.org</a>
ASME	American Society of Mechanical Engineers International	New York	NY	(800) 843-2763	<a href="http://www.asme.org">www.asme.org</a>
ASTM	ASTM International	West Conshohocken	PA	(610) 832-9500	<a href="http://www.astm.org">www.astm.org</a>
AWI	Architectural Woodwork Institute	Potomac Falls	VA	(571) 323-3636	<a href="http://www.awinet.org">www.awinet.org</a>
AWPA	American Wood Protection Association	Birmingham	AL	(205) 733-4077	<a href="http://www.awpa.com">www.awpa.com</a>
AWS	American Welding Society	Miami	FL	(800) 443-9353	<a href="http://www.aws.org">www.aws.org</a>
AWWA	American Water Works Assoc	Denver	CO	(303) 794-7711	<a href="http://www.awwa.org">www.awwa.org</a>
BHMA	Builders Hardware Manufacturers Association	New York	NY	(212) 297-2122	<a href="http://www.buildershardware.com">www.buildershardware.com</a>
BIA	Brick Industry Association	Reston	VA	(703) 620-0010	<a href="http://www.bia.org">www.bia.org</a>
CFI	International Certified Floorcovering Installers, Inc.	Kansas City	MO	(816) 231-4646	<a href="http://www.cfi-installers.org">www.cfi-installers.org</a>
CRI	Carpet & Rug Institution	Dalton	GA	(706) 278-3176	<a href="http://www.carpet-rug.com">www.carpet-rug.com</a>
CRSI	Concrete Reinforcing Steel Institute	Schaumburg	IL	(847) 517-1200	<a href="http://www.crsi.org">www.crsi.org</a>
CISPI	Cast Iron Soil Pipe Institute	Chattanooga	TN	(423) 892-0137	<a href="http://www.cispi.org">www.cispi.org</a>
DHI	Door & Hardware Institute	Chantilly	VA	(703) 222-2010	<a href="http://www.dhi.org">www.dhi.org</a>
DIPRA	Ductile Iron Pipe Research Association.	Birmingham	AL	(205) 402-8700	<a href="http://www.dipra.org">www.dipra.org</a>
EIMA	EIFS Industry Members Association	Morrow	GA	(800) 294-3462	<a href="http://www.eima.com">www.eima.com</a>
FM	FM Global	Johnston	RI	(401) 275-3000	<a href="http://www.fmglobal.com">www.fmglobal.com</a>

FSC	Forest Stewardship Council	Bonn, Germany		+49 (0) 228 367 66 0	<a href="http://www.fsc.org">www.fsc.org</a>
GA	Gypsum Association	Hyattsville	MD	(301) 277-8686	<a href="http://www.gypsum.org">www.gypsum.org</a>
GS	Green Seal	Washington	DC	(202) 872-6400	<a href="http://www.greenseal.org">www.greenseal.org</a>
HPVA	Hardwood Plywood & Veneer Association	Reston	VA	(703) 435-2900	<a href="http://www.hpva.org">www.hpva.org</a>
ICC	International Code Council	Washington	DC	(888) 422-7233	<a href="http://www.iccsafe.org">www.iccsafe.org</a>
ICC-ES	ICC Evaluation Service	Whittier	CA	(562) 699-0543	<a href="http://www.icc-es.org">www.icc-es.org</a>
ICBO	International Conference of Building Officials				(See ICC)
ISO	International Organization for Standardization	Geneva, Switzerland			<a href="http://www.iso.org">www.iso.org</a>
ISSA	International Slurry Surfacing Association	Annapolis	MD	(410) 267-0023	<a href="http://www.slurry.org">www.slurry.org</a>
KCMA	Kitchen Cabinet Manufactures Association	Reston	VA	(703) 264-1690	<a href="http://www.kcma.org">www.kcma.org</a>
LPI	Lightning Protection Institute	Maryville	MO	(800) 488-6864	<a href="http://www.lightning.org">www.lightning.org</a>
MFMA	Maple Flooring Manufacturers' Association	Deerfield	IL	(888) 480-9138	<a href="http://www.maplefloor.org">www.maplefloor.org</a>
MSS	Manufacturer's Standardization Society of The Valve and Fittings Industry	Vienna	VA	(703) 281-6613	<a href="http://www.mss-hq.com">www.mss-hq.com</a>
NAAMM	National Association of Architectural Metal Manufacturers	Glen Ellyn	IL	(630) 942-6591	<a href="http://www.naamm.org">www.naamm.org</a>
NEC	National Electric Code	(from NFPA).			
NEMA	National Electrical Manufacturer's Association	Rosslyn	VA	(703) 841-3200	<a href="http://www.nema.org">www.nema.org</a>
NFPA	National Fire Protection Association	Quincy	MA	(800) 344-3555	<a href="http://www.nfpa.org">www.nfpa.org</a>
NFRC	National Fenestration Rating Council	Greenbelt	MD	(301) 589-1776	<a href="http://www.nfrc.org">www.nfrc.org</a>
NSF	NSF International	Ann Arbor	MI	(734) 769-8010	<a href="http://www.nsf.org">www.nsf.org</a>
PCA	Portland Cement Association	Skokie	IL	(847) 966-6200	<a href="http://www.cement.org">www.cement.org</a>
PCI	Precast / Prestressed Concrete Institute	Chicago	IL	(312) 786-0300	<a href="http://www.pci.org">www.pci.org</a>
PEI	Porcelain Enamel Institute	Norcross	GA	(770) 676-9366	<a href="http://www.porcelainenamel.com">www.porcelainenamel.com</a>
RFCI	Resilient Floor Covering Institute	LaGrange	GA	(706) 882-3833	<a href="http://www.rfci.com">www.rfci.com</a>
SCTE	Society of Cable Telecommunications Engineers	Exton	PA	(800) 542-5040	<a href="http://www.scte.org">www.scte.org</a>
SDI	Steel Deck Institute	Fox River Grove	IL	(847) 458-4647	<a href="http://www.sdi.org">www.sdi.org</a>
SDI	Steel Door Institute	Westlake	OH	(440) 899-0010	<a href="http://www.steeldoor.org">www.steeldoor.org</a>
SIGMA	Sealed Insulating Glass Manufacturer's Association	Chicago	IL	(312) 644-6610	<a href="http://www.arcata.com">www.arcata.com</a>
SJI	Steel Joist Institute	Myrtle Beach	SC	(843) 293-1995	<a href="http://www.steeljoist.org">www.steeljoist.org</a>
SMACNA	Sheet Metal & Air Conditioning Contractors National Association	Chantilly	VA	(703) 803-2980	<a href="http://www.smacna.org">www.smacna.org</a>
SPIB	Southern Pine Inspection Bureau	Pensacola	FL	(850) 434-2611	<a href="http://www.spib.org">www.spib.org</a>
SSMA	Steel Stud Manufacturer's Association	Glen Ellyn	IL	(630) 942-6592	<a href="http://www.ssma.com">www.ssma.com</a>
TCNA	Tile Council of North	Anderson	SC	(864) 646-8453	<a href="http://www.tileusa.com">www.tileusa.com</a>

	America				
TPI	Truss Plate Institute	Alexandria	VA	(703) 683-1010	<a href="http://www.tpinst.org">www.tpinst.org</a>
TPI	Turfgrass Producers International (formally American Sod Producers Association)	East Dundee	IL	(847) 649-5555	<a href="http://www.turfgrasssod.org">www.turfgrasssod.org</a>
UL	Underwriters Laboratories	Camas	WA	(877) 854-3577	<a href="http://www.ul.com">www.ul.com</a>
WDMA	Window and Door Manufacturer's Association	Chicago	IL	(312) 321-6802	<a href="http://www.nwwda.org">www.nwwda.org</a>
WWPA	Western Wood Products Association	Portland	OR	(503) 224-3930	<a href="http://www.wwpa.org">www.wwpa.org</a>

D. Federal Government Agencies:

- Names and titles of federal government standard or specification producing agencies are often abbreviated. Following acronyms or abbreviations referenced in Contract Documents represent names of standard or specification producing agencies of federal government. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up to date as of date of Contract Documents.

CS	Commercial Standard (U S Department of Commerce)	Washington	DC	(202) 512-0000	<a href="http://www.doc.gov">www.doc.gov</a>
EPA	Environmental Protection Agency	Washington	DC	(202) 272-0167	<a href="http://www.epa.gov">www.epa.gov</a>
FCC	Federal Communications Commission	Washington	DC	(888) 225-5322	<a href="http://www.fcc.gov">www.fcc.gov</a>
FS	Federal Specifications Unit (Available from GSA)	Washington	DC	(202) 619-8925	<a href="http://www.gsa.gov">www.gsa.gov</a>
MIL	Military Standardization Documents (U S Department of Defense)	Philadelphia	PA	(215) 697-2179	<a href="http://www.dod.gov">www.dod.gov</a>
NIST	National Institute of Standards and Technology, technology Administration (US Department of Commerce)	Gaithersburg	MD	(301) 975-4500	<a href="http://www.ts.nist.gov">www.ts.nist.gov</a>
OSHA	Occupational Safety & Health Administration (U S Department of Labor)	Washington	DC	202) 219-8148	<a href="http://www.osha.gov">www.osha.gov</a>
PS	Product Standard of NBS (U S Department of Commerce)	Washington	DC	(202) 512-1800	<a href="http://www.doc.gov">www.doc.gov</a>

E. Governing Regulations / Authorities:

- Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.
- Obtain copies of regulations required to be retained at Project Site, available for reference by parties who have a reasonable need for such reference.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

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**SECTION 01 4301****QUALITY ASSURANCE - QUALIFICATIONS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Related Documents:
  - 1. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Requirements:
  - 1. Section 01 4000: 'Quality Requirements' includes administrative and procedural requirements for quality assurance and quality control.
  - 2. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Accreditation: Process in which certification of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
  - 2. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
  - 3. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
  - 4. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM E329-18, 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.'

**1.3 QUALIFICATIONS**

- A. Qualifications: Qualifications paragraphs in this Article establish minimum qualification levels required; individual Specification Sections specify additional requirements:
  - 1. Manufacturers / Distributors / Fabricator / Suppliers / Installers Qualifications: Firm experienced in producing products similar to those indicated for this Project and with record of successful in-service performance, as well as sufficient production capacity to produce required units.
    - a. Owner established Relationships:
      - 1) Where heading 'Category One, Two, or Three Approved' *Manufacturers / Suppliers / Distributors / Installers* is used to identify list Owner established Relationships, Owner has established relationships that extend beyond requirements of this Project.
      - 2) No other *Manufacturers / Suppliers / Distributors / Installers* will be acceptable.
      - 3) Follow specified procedures to preserve relationships between Owner and specified *Manufacturers / Suppliers / Distributors / Installers* and advantages that accrue to Owner from those relationships.
      - 4) Following areas of the Work have restrictions on sub-bids by Contractor:

- a) Aluminum-Framed Entrances And Storefronts, Section 08 4113: Category Three Approved, no other Manufacturer / Installers accepted.
  - b) Architectural Woodwork, Section 06 4001: Category Three Approved, no other Fabricator accepted except approved Alternate Fabricator.
  - c) Asphalt Shingles, Section 07 3113: Category Three Approved, no other Manufacturer / Installers accepted.
  - d) Common Finish Hardware Requirements, Section 08 7101: Category Three Approved, no other Supplier accepted:
    - (1) Accessories, Section 08 7109.
    - (2) Accessories for Pairs of Doors, Section 08 7105.
    - (3) Closing Devices, Section 08 7106.
    - (4) Hanging Devices, Section 08 7102.
    - (5) Operating Trim, Section 08 7104.
    - (6) Protective Plates and Trim, Section 08 7107.
    - (7) Securing Devices, Section 08 7103.
    - (8) Stops and Holders, Section 08 7108.
  - e) Custom Hollow Metal Doors and Frames, Section 08 1113: Category Three Approved, no other Supplier accepted:
  - f) Ethylene-Propylene-Diene-Monomer Roofing: EPDM, Section 07 5323: Category Three Approved, no other Manufacturer / Installers accepted.
  - g) Flush Wood Doors: Factory Finished, Clear, Section 08 1429: Category Three Approved, no other Supplier accepted.
  - h) Hollow Metal Frames, Section 08 1213: Category Three Approved, no other Supplier accepted.
  - i) Hollow Metal Doors, Section 08 1313: Category Three Approved, no other Supplier accepted.
  - j) Polyvinyl-Chloride Roofing: PVC, Section 07 5419: Category Three Approved, no other Manufacturer / Installers accepted.
  - k) Sheet Carpeting, Section 09 6816: Category One Approved, no other Manufacturer / Installers accepted.
  - l) Thermoplastic Polyolefin Roofing: TPO, Section 07 5423: Category Three Approved, no other Manufacturer / Installers accepted.
  - m) Tile Carpeting, Section 09 6813: Category One Approved, no other Manufacturer / Installers accepted.
- b. Approved:
- 1) Where heading '*Approved Suppliers / Distributors / Installers / Applicators / Fabricators*' is used to identify list of specified suppliers / distributors / installers / applicators / fabricators, use only listed suppliers / installers / fabricators.
  - 2) No substitutions will be allowed.
  - 3) Following areas of the Work have restrictions on sub-bids by which may be accepted by Contractor:
    - a) Architectural Woodwork, Sections 06 4001: Alternate Fabricator approved by Architect before bidding.
    - b) Electric And Electronic Control System for HVAC, Section 23 0933, No other Distributors accepted.
    - c) Rough Carpentry, Sections 06 1100, 06 1636, 06 1712, 06 1733, and 06 1800: Alternate Supplier approved by Architect before bidding.
- c. Acceptable Suppliers / Installers:
- 1) Where heading '*Acceptable Suppliers / Installers / Fabricators*' is used, qualifications as specified in Quality Assurance in Part 1 of individual sections will be used to determine requirements of those that will be acceptable to be used on Project. Lists for acceptable installers can include additional installers that may be approved before bidding or by addendum.
    - a) Underground Sprinklers, Section 32 8423: Acceptable Landscape Installers approved by Landscape Architect before bidding. Equal Landscape Installers to be approved by Architect before bidding.
2. Factory-Authorized Service Representative Qualifications:
- a. Authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

3. Installer Qualifications:
  - a. Firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
4. Manufacturer Qualifications:
  - a. Firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
5. Manufacturer's Field Services Qualifications:
  - a. Experienced authorized representative of manufacturer to inspect field-assembled components and equipment installation, including service connections.
6. Professional Engineer Qualifications:
  - a. Professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
7. Specialists:
  - a. Certain sections of Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations.
  - b. Specialists shall satisfy qualification requirements indicated and shall be engaged for activities indicated.
  - c. Requirement for specialists shall not supersede building codes and regulations governing the Work.
8. Testing Agency Qualifications:
  - a. Independent Testing Agency with experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
    - 1) Testing Laboratory:
      - a) AASHTO Materials Reference Laboratory (AMRL) Accreditation Program.
      - b) Cement and Concrete Reference Laboratory (CCRL).
      - c) Nationally Recognized Testing Laboratory (NRTL): Nationally recognized testing laboratory according to 29 CFR 1910.7.
      - d) National Voluntary Laboratory (NVLAP): Testing Agency accredited according to National Institute of Standards and Technology (NIST) Technology Administration, U. S. Department of Commerce Accreditation Program.

**PART 2 - PRODUCTS Not Used****PART 3 - EXECUTION Not Used****END OF SECTION**

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**SECTION 01 4523****TESTING AND INSPECTING SERVICES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes testing, inspections, special testing, special inspections, and testing laboratory services for materials, products, and construction methods as specified hereafter for the Work.
- B. Specified tests, inspections, and related actions do not limit Contractor's quality control procedures to fully comply with Contract Document requirements in all regards.
- C. Costs: Costs of initial services for testing and inspection personnel will be paid by Owner unless otherwise noted.
  - 1. If initial tests indicate non-compliance with contract document requirements, any subsequent testing will be performed by same personnel and paid for by Contractor.
- D. Related Requirements:
  - 1. Section 01 4000: 'Quality Requirements' includes administrative and procedural requirements for quality assurance and quality control.
  - 2. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
  - 3. Division 01 through Division 49 establish responsibility for providing specific testing and inspections and Field Tests and Inspections.

**1.3 REFERENCES**

- A. Association Publications:
  - 1. Council of American Structural Engineers. CASE Form 101: *Statement of Special Inspections*. Washington, DC: CASE, 2001. (c/o American Council of Engineering Companies, 1015 15<sup>th</sup> St., NW, Washington, DC 20005; 202-347-7474; [www.acec.org](http://www.acec.org)).
  - 2. International Code Council (IBC):
    - a. IBC Chapter 17, 'Structural Tests and Special Inspections'.
- B. Definitions:
  - 1. Accreditation: Process in which **certification** of competency, authority, or credibility is presented. Verify that laboratories have an appropriate quality management system and can properly perform certain test methods (e.g., ANSI, ASTM, and ISO test methods) and calibration parameters according to their scopes of accreditation.
  - 2. Approved: To authorize, endorse, validate, confirm, or agree to.
  - 3. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections to assure compliance to Contract Documents.
  - 4. Inspection/Special Inspection:
    - a. Inspection: Not required by code provisions but may be required by Contract Documents.
    - b. Special Inspection: Inspection required of materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance

- with approved construction documents and reference standards (required by code provisions and by Contract Documents).
- c. Special Inspection-Continuous: Full-time observation of the Work requiring inspection by approved inspector who is present in area where the Work is being performed.
  - d. Special Inspection-Periodic: Part-time or intermittent observation of the Work requiring inspection by approved inspector who is present in area where the Work has been or is being performed and at completion of the Work.
5. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation. They are not samples. Approved mockups establish standard by which the Work will be judged.
  6. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
  7. Preconstruction Testing: Tests and inspections that are performed specifically for Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
  8. Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
  9. Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
  10. Special Inspection: See Inspection.
  11. Special Inspector: Certified individual or firm that implements special inspection program for project.
  12. Special Test: See Test.
  13. Test/Special Test: Field or laboratory tests to determine characteristics and quality of building materials and workmanship:
    - a. Test: Not required by code provisions but may be required by Contract Documents.
    - b. Special Test: Required by code provisions and by Contract Documents.
  14. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
  15. Testing Agency Laboratory: Agency or firm qualified to perform field and laboratory tests to determine characteristics and quality of materials and workmanship.
  16. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.
- C. Reference Standards:
1. ASTM International:
    - a. ASTM A898/A898M-17, 'Standard Specification for Straight Beam Ultrasonic Examination of Rolled Steel Structural Shapes'.
    - b. ASTM C42/C42M-18, 'Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete'.
    - c. ASTM C138/C138M-17a, 'Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete'.
    - d. ASTM C597-16, 'Standard Test Method for Pulse Velocity Through Concrete'.
    - e. ASTM C803/C803M-18, 'Standard Test Method for Penetration Resistance of Hardened Concrete'.
    - f. ASTM C805/C805M-13a, 'Standard Test Method for Rebound Number of Hardened Concrete'.
    - g. ASTM C1019-18, 'Standard Test Method for Sampling and Testing Grout'.
    - h. ASTM C1021-08(2014), 'Standard Practice for Laboratories Engaged in Testing of Building Sealants'.
    - i. ASTM C1077-17, 'Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation'.
    - j. ASTM C1093-15a, 'Standard Practice for Accreditation of Testing Agencies for Masonry'.
    - k. ASTM D3666-16, 'Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials'.

- l. ASTM D3740-12a, 'Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction'.
  - m. ASTM E114-15, 'Standard Practice for Ultrasonic Pulse-Echo Straight-Beam Examination by the Contact Method'.
  - n. ASTM E164-13, 'Standard Practice for Contact Ultrasonic Testing of Weldments'.
  - o. ASTM E329-18: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing'.
  - p. ASTM E488-18, 'Standard Test Methods for Strength of Anchors in Concrete Elements'.
  - q. ASTM E543-15, 'Standard Specification for Agencies Performing Nondestructive Testing'.
  - r. ASTM E587-15, 'Standard Practice for Ultrasonic Angle-Beam Examination by the Contact Method'.
  - s. ASTM E709-15, 'Standard Guide for Magnetic Particle Testing'.
  - t. ASTM E1212-17, 'Standard Practice for Quality Management Systems for Nondestructive Testing Agencies'.
  - u. ASTM F710-17, 'Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring'.
  - v. ASTM F2170-18, 'Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes'.
2. Code of Federal Regulations:
    - a. 29 CFR 1910, Subpart A, Section 1910.7, 'Definition and Requirements for a Nationally Recognized Testing Laboratory'.
  3. International Code Council Code (IBC) (2018 or most recent edition adopted by AHJ):
    - a. IBC Chapter 17, 'Special Inspections And Tests'.
      - 1) Section 1704, 'Special Inspections And Tests, Contractor Responsibility And Structural Observations'.
      - 2) Section 1705, 'Required Special Inspection And Tests'.
        - a) Section 1705.2, 'Steel Construction'.

#### 1.4 SUBMITTALS

- A. Informational Submittals:
  1. General: Additional submittal requirements are specified in Individual Sections in Division 01 through Division 50.
  2. Certificates:
    - a. Testing Agency will submit certified written report of each inspection, test, or similar service.
  3. Tests and Evaluation Reports:
    - a. Testing Agency or Agencies will prepare logs, test reports, and certificates applicable to specific tests and inspections and deliver copies (or electronic record) distributed as follows:
      - 1) 1 copy to Owner's Representative.
      - 2) 1 copy to Architect.
      - 3) 1 copy to Consulting Engineers (Engineer of Record).
      - 4) 1 copy to General Contractor.
      - 5) 1 copy to Authorities Having Jurisdiction (if required).
    - b. Other tests, certificates, and similar documents will be obtained by Contractor and delivered to Owner's Representative and Architect in such time as not to delay progress of the Work or final payment therefore.
    - c. Submittal Format:
      - 1) Schedule of Tests and Inspections: Prepare in tabular form and include following:
        - a) Specification Section number and title.
        - b) Description of test and inspection.
        - c) Identification of applicable standards.
        - d) Identification of test and inspection methods.
        - e) Number of tests and inspections required.
        - f) Time schedule or time span for tests and inspections.
        - g) Entity responsible for performing tests and inspections.
        - h) Requirements for obtaining samples.
      - 2) Certified written reports of each inspection, test, or similar service will include, but not be limited:

- a) Date of issue.
  - b) Project title and number.
  - c) Name, address, and telephone number of Testing Agency.
  - d) Dates and locations of samples and tests or inspections.
  - e) Names of individuals making tests and inspections.
  - f) Description of the Work and test and inspection method.
  - g) Identification of product and Specification Section.
  - h) Complete test or inspection data.
  - i) Test and inspection results and an interpretation of test results.
  - j) Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  - k) Comments or professional opinion on whether tested or inspected Work complies with Contract Document requirements.
  - l) Name and signature of laboratory inspector.
  - m) Recommendations on retesting and re-inspecting.
4. Source Quality Control Submittals:
- a. Testing Agency will submit following prior to commencing the Work:
    - 1) Qualifications of Testing Agency management and personnel designated to project.
    - 2) Testing Agency 'Written Practice for Quality Assurance'.
    - 3) Qualification records for Inspector and non-destructive testing technicians designated for project.
    - 4) Testing Agency non-destructive testing procedures, equipment calibration records, and personnel training records.
    - 5) Testing Agency Quality Control Plan for monitoring and control of testing operations.
    - 6) Welding Inspection Procedures (Structural Steel testing).
    - 7) Bolting Inspection Procedures (Structural Steel testing).
    - 8) Shear Connector Stud Inspection Procedures (Structural Steel testing).
    - 9) Seismic Connections Inspection Procedures (Structural Steel testing).

## 1.5 QUALITY ASSURANCE

- A. Owner or Owner's designated representative(s) will perform quality assurance. Owner's quality assurance procedures may include observations, inspections, testing, verification, monitoring and any other procedures deemed necessary by Owner to verify compliance with Contract Documents.
- B. Owner will employ independent Testing Agencies to perform certain specified testing, as Owner deems necessary.
- C. Certification:
  1. Product producers and associations, which have instituted approved systems of quality control and which have been approved by document approval agencies, are not required to have further testing.
  2. Concrete mixing plants, plants producing fabricated concrete and wood or plywood products certified by agency, lumber, plywood grade marked by approved associates, and materials or equipment bearing underwriters' laboratory labels require no further testing and inspection.
- D. Written Practice for Quality Assurance:
  1. Testing Agency will maintain written practice for selection and administration of inspection personnel, describing training, experience, and examination requirements for qualification and certification of inspection personnel.
  2. Written practice will describe testing agency procedures for determining acceptability of structure in accordance with applicable codes, standards, and specifications.
  3. Written practice will describe Testing Agency inspection procedures, including general inspection, material controls, visual welding inspection, and bolting inspection.



## 1.6 QUALITY CONTROL

- A. Quality Control will be sole responsibility of Contractor. Contractor will be responsible for testing and inspections, coordination, start-up, operational checkout, and commissioning of all items of the Work included in Project. All costs for these services will be included in Contractor's cost of the Work.
- B. Contractor will assign one (1) employee to be responsible for Quality Control. This individual may have other responsibilities and may be Contractor's Project superintendent or Contractor's Project Manager.
- C. Notify results of all Testing and Inspection performed by Contractor's independent Testing Agencies to Architect and Owner's Representative within twenty four (24) hours of test or inspection having been performed.
  1. Testing and Inspection Reports will be distributed as follows:
    - a. 1 copy to Owner's Representative.
    - b. 1 copy to Architect.
    - c. 1 copy to Consulting Engineer(s) (Engineer of Record).
    - d. 1 copy to Authorities Having Jurisdiction (if required).
- D. Contractor's Responsibility:
  1. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents.
  2. Tests and inspections that are not explicitly assigned to Owner are responsibility of Contractor.
  3. Cooperate with Testing Agency(s) performing required inspections, tests, and similar services and provide reasonable auxiliary services as requested. Notify Testing Agency before operations to allow assignment of personnel. Auxiliary services required include but are not limited to:
    - a. Providing access to the Work and furnishing incidental labor, equipment, and facilities deemed necessary by Testing Agency to facilitate inspections and tests at no additional cost to Owner.
    - b. Taking adequate quantities of representative samples of materials that require testing or helping Testing Agency in taking samples.
    - c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
    - d. Providing Testing Agency with preliminary design mix proposed for use for materials mixes that require control by Testing Agency.
  4. Contractor will integrate Owner's independent Testing Agency services within Baseline Project Schedule and with other Project activities.
  5. For any requested inspection, Contractor will complete prior inspections to ensure that items are ready for inspection.
  6. All Work is subject to testing and inspection and verification of correct operation prior to 100% payment to Contractor of line item(s) pertaining to that aspect of the Work.
  7. For Mechanical Equipment, inspection and documented approval of individual equipment and/or system(s) must be accomplished prior to requesting Substantial Completion Inspection for any area affected by said equipment and/or system:
    - a. Contractor will perform thorough checkout of operations with manufacturer's representatives prior to requesting formal inspection by Owner.
    - b. Contractor must notify Owner's Representative, in advance, as to when manufacturer's representative is scheduled to arrive at Site.
  8. Comply:
    - a. Upon completion of Testing Agency's inspection, testing, sample-taking, and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes.
    - b. Comply with Contract Documents in making such repairs.
  9. Data: Furnish records, drawings, certificates, and similar data as may be required by testing and inspection personnel to assure compliance with Contract Documents.
  10. Defective Work (Non-Conforming Work): Non-conforming Work as covered in General Conditions applies, but is not limited to following requirements:

- a. Where results of inspections, tests, or similar services show that the Work does not comply with Contract Document requirements, correct deficiencies in the Work promptly to avoid Work delays.
  - b. Where testing personnel take cores or cut-outs to verify compliance, repair prior to acceptance.
  - c. Contractor responsible for any and all costs incurred resulting from inspection that was scheduled prematurely or retesting due to failed tests.
  - d. Remove and replace any Work found defective or not complying with contract document requirements at no additional cost to Owner.
  - e. Should test return unacceptable results, Contractor will bear all costs of retesting and re-inspection as well as cost of all material consumed by testing, and replacement of unsatisfactory material and/or workmanship.
11. Protection:
- a. Protect construction exposed by or for quality assurance and quality control service activities, and protect repaired construction.
12. Scheduling: Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities:
- a. Schedule testing and inspections in advance so as not to delay the Work and to eliminate any need to uncover Work for testing or inspection.
  - b. Notify Testing Agency and Architect as noted in Sections in Division 01 through Division 50 prior to any time required for such services.
  - c. Incorporate adequate time for performance of all inspections and correction of noted deficiencies.
  - d. Schedule sequence of activities to accommodate required services with minimum of delay.
  - e. Schedule sequence of activities to avoid necessity of removing and replacing construction to accommodate testing and inspections
13. Test and Inspection Log:
- a. Provide system of tracking all field reports, describing items noted, and resolution of each item. Prepare record of tests and inspections. Include following:
    - 1) Date test or inspection was conducted.
    - 2) Description of the Work tested or inspected.
    - 3) Date test or inspection results were transmitted to Architect.
    - 4) Identification of Testing Agency or inspector conducting test or inspection.
  - b. Maintain log at Project site:
    - 1) Post changes and modifications as they occur.
    - 2) Provide access to test and inspection log for Architect's reference during normal working hours.

## 1.7 TESTING AND INSPECTIONS - GENERAL

- A. Testing specifically identified to be conducted by Owner, will be performed by an independent entity and will be arranged and paid for by Owner.
- B. Individual Sections in Division 01 through Division 49 indicate if Owner will provide testing and inspection of the Work of that Section.
- C. Tests include but not limited to those described in detail in 'Field Quality Control' in Part 3 of Individual Sections in Divisions 01 through Division 49.
- D. Owner may engage additional consultants for testing, air balancing, commissioning, or other special services:
  1. Activities of any such Owner consultants are in addition to Contractor testing of materials or systems necessary to prove that performance is in compliance with Contract requirements.
  2. Contractor must cooperate with persons and firms engaged in these activities.
- E. Taking Specimens:
  1. Except as may be specifically otherwise approved by Architect, only testing laboratory shall secure, handle, transport, or store any samples and specimens for testing.

- F. Scheduling Testing Agency:
  - 1. Contractor will coordinate the Work and facilitate timeliness of such testing and inspecting services so as not to delay the Work.
  - 2. Contractor will notify Testing Agency and Architect to schedule tests and / or inspections.
- G. For 'building-wide' and/or life safety systems, such as emergency lighting, emergency power uninterruptible power supply systems, fire alarm, fire sprinkler systems, smoke evacuation systems, toxic gas monitoring, capturer exhaust systems, etc. formal start-up inspection will be completed prior to requesting Substantial Completion Inspection for any area of Project:
  - 1. Manufacturer's representatives and installing contractor will demonstrate both operation and compliance to Owner's agents and consultants. If coordinated and scheduled appropriately by Contractor, these equipment and/or systems inspections may also serve to provide required Owner training, if approved in advance by Owner.
  - 2. Contractor responsible for requesting that Architect arrange for inspection of materials, equipment, and work prior to assembly or enclosure that would make materials, equipment, or work inaccessible for inspection and at other times as may be required.

## 1.8 TESTING AGENCY SERVICES AND RESPONSIBILITIES

- A. Testing Agency, including independent testing laboratories, will be licensed and authorized to operate in jurisdiction in which Project is located.
  - 1. Approved Testing Agency Qualifications: Requirements of Section 01 4301 apply.
- B. Testing and Inspection Services:
  - 1. Testing Agency will not release, revoke, alter, or increase Contract Document requirements or approve or accept any portion of the Work.
  - 2. Testing Agency will not give direction or instruction to Contractor.
  - 3. Testing Agency will have full authority to see that the Work is performed in strict accordance with requirements of Contract Documents and directions of Owner's Representative and/or Architect.
  - 4. Testing Agency will not provide additional testing and inspection services beyond scope of Work without prior approval of Owner's Representative and / or Architect.
- C. Excavation Support and Protection:
  - 1. Anchor tie-back System:
    - a. Observe and record proof tests.
  - 2. Soil Nail Systems:
    - a. Observe and record proof tests.
    - b. Observe drilling for changes in soil type, hole diameter, length, and cleanliness.
    - c. Periodically observe placement of drainage materials, reinforcing, and shotcrete.
    - d. Review compressive strength test results of grout and shotcrete.
- D. Testing Agency Duties:
  - 1. Independent Testing Agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual specification Sections will cooperate with Architect and Contractor in performance of its duties and will provide qualified personnel to perform required inspections and tests.
  - 2. Testing Agency will test or obtain certificates of tests of materials and methods of construction, as described herein or elsewhere in technical specification.
  - 3. Testing Agency will provide management, personnel, equipment, and services necessary to perform testing functions as outlined in this section.
  - 4. Testing Agency must have experience and capability to conduct testing and inspecting indicated by ASTM standards and that specializes in types of tests and inspections to be performed.
  - 5. Testing Agency will comply with requirements of ASTM E329, ASTM E543, ASTM C1021, ASTM C1077, ASTM C1093, ASTM D3666, ASTM D3740, and other relevant ASTM standards.
  - 6. Testing Agency must calibrate all testing equipment at reasonable intervals (minimum yearly) with accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

7. Welding Procedure Review: Testing Agency will provide review and approval or rejection of all welding procedures to be used and will verify compliance with all reference standard requirements.

E. Testing and Inspection Reports:

1. Conduct and interpret tests and inspections and state in each report whether tested and inspected the Work complies with or deviates from requirements.
2. Laboratory Reports: Testing Agency will furnish reports of materials and construction as required, including:
  - a. Description of method of test.
  - b. Identification of sample and portion of the Work tested.
    - 1) Description of location in the Work of sample.
    - 2) Time and date when sample was obtained.
    - 3) Weather and climatic conditions at time when sample was obtained.
  - c. Evaluation of results of tests including recommendations for action.
3. Inspection Reports:
  - a. Testing Agency will furnish 'Inspection at Site' reports for each site visit documenting activities, observations, and inspections.
  - b. Include notation of weather and climatic conditions, time and date conditions and status of the Work, actions taken, and recommendations or evaluation of the Work.
4. Reporting Testing and Inspection (Conforming Work):
  - a. Submit testing and inspection reports as required within twenty four (24) hours of test or inspection having been performed.
5. Reporting Testing and Inspection Defective Work (Non-Conforming Work):
  - a. Testing Agency, upon determination of irregularities, deficiencies observed or test failure(s) observed in the Work during performance of its services of test or inspection having been performed, will:
    - 1) Verbally notify results to Architect, Contractor, and Owner's Representative within one hour of test or inspection having been performed (if Defective Work (Non-Conforming Work) is incorporated into project).
    - 2) Submit written inspection report and test results as required within twenty four (24) hours of test or inspection having been performed.
  - b. Prepare non-compliance log to track non-compliant testing or inspections.
6. Final Report:
  - a. Submit final report of tests and inspections at Substantial Completion, which identify unresolved deficiencies.

## 1.9 ARCHITECT'S RESPONSIBILITIES

- A. Architect Duties:
1. Notify Owner's Representative before each test and/or inspection.

## PART 2 - PRODUCTS Not Used

## PART 3 - EXECUTION

### 3.1 FIELD QUALITY CONTROL

- A. Field Tests And Inspections:
1. Field Tests and Inspections requirements are described in 'Field Quality Control' of individual Sections in Division 01 through Division 49.

**END OF SECTION**

**SECTION 01 4546****DUCT TESTING, ADJUSTING, AND BALANCING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Test, balance, and adjust air duct systems as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 01 0000: 'General Requirements':
    - a. Section 01 1200: Multiple contracts.
    - b. Section 01 4000: 'Quality Requirements' for administrative and procedural requirements for quality assurance and quality control.
    - c. Section 01 4301: 'Quality Assurance – Qualifications' establishes minimum qualification levels required.
    - d. Section 01 4523: 'Testing and Inspecting Services' for testing and inspection, and testing laboratory services for materials, products, and construction methods.
    - e. Section 01 7800: 'Closeout Submittals'.
  - 2. Division 23:
    - a. Completing installation and start-up of mechanical systems, and changing sheaves, belts, and dampers as required for correct balance.
    - b. Maintain HVAC system and equipment in full operation each working day of testing, balancing, and adjusting.

**1.2 REFERENCES**

- A. Definitions (Following are specifically referenced for testing):
  - 1. Approved: To authorize, endorse, validate, confirm, or agree to.
  - 2. Field Quality Assurance: Testing, Inspections, Special Testing and Special Inspections provided for by Owner.
  - 3. Field Quality Control: Testing, Inspections, Special Testing and Special Inspections provided for by Contractor.
  - 4. Inspection/Special Inspection: Inspection of materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards. "Inspection" is not required by code provisions but may be required by Contract Documents. "Special inspection" is required by code provisions and by Contract Documents.
    - a. Inspection-Continuous: Full-time observation of the Work requiring inspection by approved inspector who is present in area where the Work is being performed.
    - b. Inspection-Periodic: Part-time or intermittent observation of the Work requiring inspection by approved inspector who is present in area where the Work has been or is being performed and at completion of the Work.
  - 5. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform particular construction operation, including installation, erection, application, and similar operations.
  - 6. Observation: Visual observation of building / site elements or structural system by registered design professional for general conformance to approved construction documents at significant construction stages and at completion. Observation does not include or waive responsibility for performing inspections or special inspections.
  - 7. Owner's Representative: Owner's Designated Representative (Project Manager or Facilities Manager) whom will have express authority to bind Owner with respect to all matters requiring Owner's approval or authorization.

8. Service Provider: Agency or firm qualified to perform required tests and inspections.
9. Testing Agency: Entity engaged to perform specific tests, inspections, or both.
10. Test/Special Test: Field or laboratory tests to determine characteristics and quality of building materials and workmanship. "Test" is not required by code provisions but may be required by Contract Documents. "Special test" is required by code provisions and by Contract Documents.
11. Verification: Act of reviewing, inspecting, testing, etc. to establish and document that product, service, or system meets regulatory, standard, or specification requirements.

B. Reference Standards:

1. ASTM International (Following are specifically referenced for Testing Agencies):
  - a. ASTM E329-09: 'Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.'

### 1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Assisting Testing Agency in testing and balancing of mechanical system.

B. Scheduling:

1. Schedule this work in cooperation with other Sections involved and to comply with completion date for test, balance, and adjust air duct systems as described in Contract Documents.
2. Contact Testing Agency and coordinate:
  - a. One inspection when 90 percent of equipment and ductwork is installed.
3. Contact Testing Agency and coordinate date(s) for test and balance work when following is completed:
  - a. HVAC and exhaust systems including installation of specialties, devices, and new filters.
  - b. Proper function of control system components including electrical interlocks, damper sequences, air and water reset, and fire and freeze stats has been verified.
  - c. Automatic temperature controls have been calibrated and set for design operating conditions.
  - d. Verification of proper thermostat calibration and setting of control components such as static pressure controllers and other devices that may need set points changed during process of balancing system.
4. If, in opinion of Testing Agency, systems are not ready for test and balance, reschedule as required.

### 1.4 SUBMITTALS

A. Informational Submittals:

1. Test and Evaluation Reports:
  - a. Preliminary Report:
    - 1) Four copies to be given to Owner's Representative.
  - b. Final Report :
    - 1) Four copies to be given to Owner's Representative.

B. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Record Documentation:
    - 1) Testing and Inspection Reports:
      - a) Testing Agency Testing and Evaluation Final Report of testing, balancing, and adjusting air duct systems. Bind approved copy of Testing and Evaluation Report in Operations And Maintenance Manual for Division 23.

### 1.5 QUALITY ASSURANCE

A. Qualifications:

1. Approved Testing Agency. Section 01 4301 applies, but is not limited to following:
  - a. Testing Agency shall specialize in testing and balancing of heating, ventilating, and cooling systems to balance, adjust, and test air moving equipment, air distribution, and exhaust systems.
  - b. Testing Agency shall provide proof of having successfully completed at least five years of specialized experience in air and hydronic system balancing.
  - c. Testing Agency shall provide testing under direct supervision of qualified heating and ventilating engineer.
  - d. Neither Architect's engineering consultant nor anyone performing work on this Project under other Sections of Division 23 shall be permitted to do this work.
2. Testing and Inspection.
  - a. Owner will provide Testing and Inspection for testing, balancing, and adjusting air duct systems:
    - 1) See Section 01 1200: 'Multiple Contract Summary'.

## **PART 2 - PRODUCTS: Not Used**

## **PART 3 - EXECUTION**

### **3.1 FIELD QUALITY CONTROL**

#### **A. Field Tests:**

1. Air System Testing, Adjusting, And Balance:
  - a. Inspections and site visits. (For paragraph a thru c, note deficiencies, if any, that needs to be corrected and report this to Owner's Representative, Architect, and Mechanical Engineer):
    - 1) One inspection when equipment installation is 90% complete.
    - 2) Site visit for test and balance. Before commencing test and balance, perform an inspection to verify 100% completion of system. Confirm completion of work, correction of previously noted deficiencies, and look for new deficiencies not noted in previous inspections. If the work is complete, then proceed with test and balance. If the work is not complete and ready for test and balance, inform Contractor and submit an invoice to Owner's Representative for compensation for travel time, expenses, and time on site. Report deficiencies or incomplete work to Owner's Representative, Architect, and Mechanical Engineer.
    - 3) Additional site visits (beyond those set forth above) to complete the work after issues are resolved may be needed and will be paid for separately from compensation for services set forth in this Agreement, pursuant to hourly rates and conditions set forth in Attachment "A".
  - b. Checklist for Inspections and site visits:
    - 1) Pre-Startup Inspection – use for inspections and site visits a thru d in paragraph 1 above. All pertinent items shall be checked, including but not limited to following:
      - a) Removal of shipping blocks and stops.
      - b) Vibration isolators' alignment and adjustment.
      - c) Flexible connections properly installed and aligned.
      - d) Safety controls, safety valves and high or low limits in operation.
      - e) All systems properly filled.
      - f) Filters in place and seal provided around edges.
      - g) Filters and strainers are clean.
      - h) Fire damper installation and operation, and access door installation.
      - i) Installation of all gauges on equipment.
      - j) Control system is operating.
      - k) All dampers, valves, and operators are properly installed and operating.
      - l) All ductwork is installed and sealed.
      - m) Voltage to unit matches nameplate voltage.
    - 2) First Run Inspection – use for inspections and site visits d and e in paragraph 1 above. Recheck items in Pre-Startup list, and check for following items:

- a) Excessive vibration or noise.
  - b) Loose components.
  - c) Initial control settings.
  - d) Motor amperages.
  - e) Heat buildup in motors.
  - f) Control system is calibrated and functioning as required.
- 3) System Operation Inspection – use for inspections and site visits d and e in paragraph 1 above. Observe mechanical systems under operation for sufficient amount of time to ensure proper operation in all running modes. Check following items periodically.
- a) Filters and strainers.
  - b) Filters and strainers.
  - c) Check for system leaks at seals and valves.
- c. Performance Requirements:
- 1) Testing and balancing in complete accordance with Associated Air Balance Council (AABC) Standards for Field Measurement & Instructions, Form P1266, Volume I.
  - 2) Noise level in chapel and / or cultural hall shall not exceed NC 35 with all HVAC equipment operating in full or second stage cooling mode.
- d. Site tests: Air Test and Balancing Procedure:
- 1) Instruments used by Consultant shall be accurately calibrated and maintained in good working order.
  - 2) All supply air and return air fans in all HVAC zone systems, energy recovery ventilators, and exhaust fans in building shall be operating when final setup of all units is performed.
  - 3) Perform tests at high and low speeds of multi-speed systems and single speed systems.
  - 4) Perform following testing and balancing functions in accordance with Associated Air Balance Council National Standards.
    - a) Fan Speeds - Air handling units (with variable pitch pulleys and sheaves): Test and adjust fan RPM to achieve design CFM requirements.
    - b) Fan Speeds - Furnaces (with direct drive motors): Set fan speed to lowest possible setting that will achieve design CFM requirements. Adjust down from Contractor setting, if necessary. Adjust low voltage fan speed jumpers (provided and installed by installing contractor) as necessary to achieve design cooling air flow at lowest possible setting. An exception to this would be when furnace is variable speed blower for dehumidification applications.
    - c) Current And Voltage: Measure and record motor current and voltage.
    - d) Pitot-Tube Traverse Method:
      - (1) Make measurements in duct where velocity is uniform, 7-1/2 duct diameters downstream and 2 duct diameters minimum upstream from any turbulence, i.e., elbow, damper, take-off, etc.
      - (2) Perform pitot-tube traverse of outdoor ventilation air duct serving each piece of air moving equipment.
      - (3) Where single outdoor ventilation air trunk duct serves multiple pieces of equipment, perform pitot-tube traverse of duct branch serving each piece of equipment as well as pitot-tube traverse of total air flow in trunk with all pieces of equipment operating.
    - e) Where pitot-tube traverse is not possible or if pitot-tube traverse is unreliable, flow hood measurement over exterior intake louver or grille is acceptable for measuring outdoor ventilation air.
    - f) Use proportionate method of air balance leaving fan at lowest possible speed and at least one branch balance damper fully open.
  - 5) Static Pressure: Test and record system static pressures, including suction and discharge static pressure of each fan.
  - 6) Air Temperature: Take wet and dry bulb air temperatures on entering and leaving side of each cooling coil. Dry bulb temperatures shall be taken on entering and leaving side of each heating unit.
  - 7) Zone Ducts: Adjust zone ducts to within design CFM requirements. At least one zone balancing damper shall be completely open.
  - 8) Branch Ducts: Adjust branch ducts to within design CFM requirements. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.



- 9) Tolerances: Test and balance all fans, zone ducts, registers, diffusers etc. to + or – 5% of design. When multiple registers and/or diffusers serve common space tolerances can be + or – 10% for outlet to outlet balance, but total air flow in space shall be + or – 5% of design requirements.
  - 10) Identification: Identify location and area of each grille, diffuser, register, and terminal box. Record on air outlet data sheets.
  - 11) Description: Record size, type, and manufacturer of each diffuser, grille, and register on air outlet data sheets.
  - 12) Drafts: Adjust diffusers, grilles, and registers to minimize drafts. For high sidewall supply air diffusers install horizontal blade core to direct air flow upward 15° and set adjustable vertical blades to spread air flow horizontally and evenly in fan pattern.
  - 13) Permanently mark all outside air, supply air, and return air damper positions after balancing has been completed.
  - 14) Smoke testing: Smoke testing, or some other approved means, may be required to determine leak locations if air balance report indicates that any system's CFM total is less than 90 percent of design CFM. Prior to test, verify that system's duct joints have been sealed as specified and that air moving device in question is supplying required design system air flow. Mechanical Engineer will approve test method required. If smoke test is selected, use following procedure. Provide necessary precautions to protect those performing or observing test from being exposed to smoke.
    - a) Use zinc chloride smoke candles, titanium tetrachloride ampules or sticks, or other devices acceptable to Mechanical engineer to generate smoke.
    - b) Close openings in duct except for one opening at farthest end of duct run.
    - c) Circulate smoke at pressurized condition of **1/2 inch (13 mm)** minimum water gauge static pressure.
    - d) Report findings to mechanical engineer in writing.
- e. Air System Test and Evaluation Report:
- 1) Record test data on AABC standard forms or facsimile.
  - 2) Preliminary Report: Provide and deliver four copies of complete data for evaluation and approval to Owner.
  - 3) Final report: Provide and deliver complete four copies of final report to Owner prior to project Substantial Completion date.
  - 4) Complete with logs, data, and records as required herein. Print logs, data, and records on white bond paper bound together in report form.
  - 5) Certified accurate and complete by Consultant's certified test and balance engineer.
  - 6) Contain following general data in format selected by Consultant:
    - a) Project Number.
    - b) Project Title.
    - c) Project Location.
    - d) Project Architect and Mechanical Engineer.
    - e) Consultant and Certified Engineer.
    - f) Contractor and mechanical sub-contractor.
    - g) Dates tests were performed.
    - h) Certification Document.
    - i) Report Forms similar to AABC Standard format.
  - 7) Report shall include following:
    - a) Instrumentation List including type, model, manufacturer, serial number, and calibration dates.
    - b) HVAC zone identification to include reduced ductwork floor plan from project documents with outlets and inlets numbered to match written test and balance report. This page may be oversized but it should fold up neatly within standard 8 1/2 x 11 report paper size.
    - c) Record following for each piece of air handling equipment:
      - (1) Manufacturer, model number, and serial number.
      - (2) Design and manufacture rated data.
      - (3) Actual CFM.
      - (4) Suction and discharge static pressure of each fan.
      - (5) Outdoor-ventilation-air and return-air total CFM.
      - (6) Final RPM of each motor or speed tap.
      - (7) Actual operating current, voltage, and brake horsepower of each fan motor.

- (8) Fan and motor sheave manufacturer, model, size, number of grooves and center distance.
- (9) Belt size and quantity.

### **3.2 PREPARATION**

- A. Heating, ventilating, and cooling systems and equipment shall be in full operation and continue in operation during each working day of testing and balancing.

**END OF SECTION**

**SECTION 01 5100****TEMPORARY UTILITIES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
1. Administrative and procedural requirements for Temporary Utilities.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Where necessary, engage appropriate local utility companies to install temporary service or connect to existing service. Where utility company provides only part of service, provide remainder with matching, compatible materials and equipment. Comply with utility company's recommendations.
1. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction.
  2. Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.
  3. Arrange with utility company and existing users for time when service can be interrupted, where necessary, to make connections for temporary services.
  4. Provide adequate capacity at each stage of construction. Before temporary utility availability, provide trucked-in services.
  5. Obtain construction easements necessary to bring temporary and/or permanent utilities to site.
  6. Use qualified personnel for installation and maintenance of temporary facilities. Locate temporary utilities where they will serve Project adequately and result in minimum interference with the Work of Owner or other Contractors on Project Site. Relocate and modify temporary utilities as required.
  7. Pay cost and use charges for temporary and permanent utilities until Substantial Completion has been granted by Owner.
- B. Prepare schedule indicating dates for implementation and termination of each temporary utility. At earliest feasible time, change over from use of temporary service to use of permanent service.
- C. Keep temporary utilities clean and neat in appearance. Operate in safe and efficient manner. Take necessary fire prevention measures. Do not overload utilities, or allow them to interfere with progress of The Work. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on Project site.
- D. Limit availability of temporary utilities to essential and intended uses to reduce waste and abuse.
- E. Maintain temporary utilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on 24-hour day basis where required to achieve indicated results and to avoid possibility of damage.
  2. Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- F. Remove each temporary utility and control when need has ended, or when replaced by permanent utility, but not later than Substantial Completion. Complete permanent construction that may have been delayed because of interference with temporary utility. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that make up temporary utilities are property of Contractor.

2. By Substantial Completion, clean and renovate permanent utilities used during construction period, including but not limited to:
  - a. Replace air filters and clean inside of ductwork and housings.
  - b. Replace significantly worn parts and parts subjected to unusual operating conditions.
  - c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

### **1.3 TEMPORARY ELECTRIC POWER**

- A. Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period.

### **1.4 TEMPORARY FIRE PROTECTION**

- A. Install and maintain temporary fire protection facilities of types needed to protect against predictable and controllable fire losses. At a minimum, provide and maintain in working order two Standard UL Labeled ABC all-purpose 10 lb fire extinguishers. Do not incorporate these extinguishers into final Project.
  1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
  2. Store combustible materials in containers in fire-safe locations.
  3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires.
  4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

### **1.5 HEATING, COOLING, AND VENTILATING:**

- A. Install and operate temporary heating, cooling, and ventilating units including fuel, temporary piping, fittings, wiring, and connections necessary to provide environmental conditions specified for various portions of the Work. Coordinate ventilation requirements to produce ambient conditions required and reduce consumption of energy.
- B. Repair damage to building and contents caused by cold, heat, dampness, and/or heating, cooling, and ventilating equipment. Select equipment that will not have harmful effect on completed installations or on elements being installed.
- C. Maintain safe conditions for use of temporary heating, cooling, and ventilating systems including, but not limited to, following requirements:
  1. Operate equipment according to equipment manufacturer's instructions.
  2. Provide fresh air ventilation required by equipment manufacturer.
  3. Keep temperature of fuel containers stabilized.
  4. Secure fuel containers from overturning.
  5. Operate equipment away from combustible materials.
- D. Permanent mechanical system may be operated subject to following conditions:
  1. Do not operate system when work causing air-borne dust is occurring or when dust caused by such work is present without installation of temporary filtering system approved by Architect.
  2. Operate system at no cost to Owner, including cost of fuel.
  3. Assume all responsibility and risk for operation of system.
  4. Return permanent mechanical equipment to 'like-new' condition for Substantial Completion Inspection.

**1.6 TEMPORARY LIGHTING**

- A. Install and operate temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

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**SECTION 01 5200****CONSTRUCTION FACILITIES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
1. Administrative and procedural requirements for Construction Facilities.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Prepare schedule indicating dates for implementation and termination of each temporary facility.
- B. Keep temporary facilities clean and neat in appearance. Operate in safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or allow them to interfere with progress of The Work. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on Project site.
- C. Maintain facilities in good operating condition until removal.
- D. Remove each temporary facility when need has ended, or when replaced by authorized use of permanent facility, or by Substantial Completion. Complete permanent construction that may have been delayed because of interference with temporary facility. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that make up temporary facilities are property of Contractor.
  2. By Substantial Completion, clean and renovate permanent facilities used during construction period.

**1.3 FIELD OFFICES**

- A. Provide and maintain insulated, weather tight temporary office of sufficient size to accommodate Contractor's personnel at Project site and for use by Owner, Architect and Subcontractors.
1. Keep office clean and orderly.
  2. Heat and cool office as needed.
  3. Furnish office with locking door, light(s), table(s), bench(es), rack(s) for drawings, telephone, and FAX machine.
  4. Make office available for progress meetings.
  5. Provide an operable fire extinguisher in facility.
  6. Provide hardhats for Owner's Representatives for site visits.
- B. If Owner agrees to permit removal of temporary office before Substantial Completion, Contractor may use a room as an office after temporary office is removed. Equip room as specified above and restore to 'like-new' condition before Substantial Completion.

**1.4 SANITARY FACILITIES**

- A. Existing restroom facilities may be used by Contractor. Clean restrooms and portions of existing building used in accessing restrooms daily. If existing facilities are not usable, provide and maintain temporary sanitary toilet.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**



**SECTION 01 5400**  
**CONSTRUCTION AIDS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Construction Aids.

**1.2 SCAFFOLDING, PLATFORMS, STAIRS, ETC**

- A. Furnish and maintain equipment such as temporary stairs, ladders, ramps, platforms, scaffolds, hoists, runways, derricks, chutes, and elevators as required for proper execution of The Work.
- B. Apparatus, equipment, and construction shall meet requirements of applicable laws and safety regulations.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

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**SECTION 01 5600**

**TEMPORARY BARRIERS AND ENCLOSURES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Temporary Barriers and Enclosures.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Protection Of Existing Improvements: Protect streets, private roads, and sidewalks, including overhead protection where required. Repair damage to existing improvements caused by construction activities.
- B. Protection Of Adjacent Property: Provide necessary protection for adjacent property and lateral support thereof.
- C. Proprietary Camera Services: In its absolute discretion, and with or without notice to Contractor, Owner may provide from time to time, but is not obligated to provide, one or more cameras on or about Project site and/or signage or notices of the same:
  - 1. If provided by Owner, such camera(s) and/or signage and notices are solely for Owner's benefit and convenience and shall not be for benefit of Contractor, Subcontractor(s) or for any third person.
  - 2. Owner shall have no liability, obligation, or responsibility to Contractor, Subcontractors, or any third person relative to such camera(s), signage, or notices, or absence of camera(s), signage, or notices, including without limitation, installation, maintenance, operation, repair, testing, functionality, capacity, recording, monitoring, posting, etc., of the same (hereafter 'Proprietary Camera Services').
  - 3. Contractor, with Owner's prior consent (which shall not be unreasonably withheld), may relocate such camera(s), signage, or notices as necessary to not unreasonably, materially and physically interfere with work at Project Site.
  - 4. Contractor's obligations under Contract Documents, including but not limited to, Contractor's obligation for security of Project Site, are not modified by Owner's opportunity to provide, actually providing, or not providing Proprietary Camera Services and/or signage or notices regarding the same.
  - 5. This Specification Section does not preclude Contractor from providing its own camera(s), signage, or notices pursuant to terms and conditions of this Agreement. Neither does this Section reduce, expand or modify any other right or obligation of Owner pursuant to terms of this Agreement.

**1.3 TEMPORARY AIR BARRIERS**

- A. Take necessary precautions to protect new and existing building elements from damage.

**1.4 TEMPORARY DUST BARRIERS**

- A. Take necessary precautions to protect new and existing building elements from damage.

**1.5 TEMPORARY BARRICADES**

- A. Comply with standards and code requirements in erecting barricades, warning signs, and lights.
- B. Take necessary precautions to protect persons, including members of the public, from injury or harm.

**1.6 TEMPORARY FENCING – Not Used**

**1.7 TEMPORARY SECURITY BARRIERS**

- A. Install temporary enclosures of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and other violations of security.
- B. Secure materials and equipment stored on site.
- C. Secure building at the end of each work day.
- D. Maintain exterior building security until Substantial Completion.

**1.8 TEMPORARY TREE AND PLANT PROTECTION – Not Used**

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

**SECTION 01 5700**  
**TEMPORARY CONTROLS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Temporary Controls.

**1.2 TEMPORARY EROSION AND SEDIMENT CONTROL – Not Used**

**1.3 TEMPORARY ENVIRONMENTAL CONTROLS**

- A. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and reduce possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result:
  - 1. Avoid use of tools and equipment that produce harmful noise.
  - 2. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near site.
- B. Provide protection against weather (rain, winds, storms, frost, or heat) to maintain all work, materials, apparatus, and fixtures free from injury or damage.
- C. Protect excavation, trenches, and building from damage from rain water, spring water, ground water, backing up of drains or sewers, and all other water:
  - 1. For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with requirements of applicable local regulations. Where feasible, use permanent facilities.
  - 2. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.
- D. Comply with governing ordinances relating to weed control and removal.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

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**SECTION 01 5800**

**PROJECT IDENTIFICATION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Project Identification.

**1.2 TEMPORARY PROJECT SIGNAGE**

- A. Contractor may, at its option, erect a temporary project identification sign.
  - 1. Sign may be free-standing or attached to temporary field office or storage shed.
  - 2. No other signs or advertisements are allowed on building site.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

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**SECTION 01 6100****COMMON PRODUCT REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
1. Administrative and procedural requirements for Common Product Requirements.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Provide products that comply with Contract Documents, that are undamaged, and, unless otherwise indicated, new and unused at time of installation. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and for intended use and effect.
- B. Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on surfaces of products that will be exposed to view in occupied spaces or on building exterior.
1. Locate required product labels and stamps on concealed surface or, where required for observation after installation, on accessible surface that is not conspicuous.
  2. Provide permanent nameplates on items of service-connected or power-operated equipment. Locate on easily accessible surface that is inconspicuous in occupied spaces. Nameplate will contain following information and other essential operating data:
    - a. Name of product and manufacturer.
    - b. Model and serial number.
    - c. Capacity.
    - d. Speed.
    - e. Ratings.
- C. Where specifications describe a product or assembly by specifying exact characteristics required, with or without use of brand or trade name, provide product or assembly that provides specified characteristics and otherwise complies with Contract requirements.
- D. Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by manufacturer for application described. General overall performance of product is implied where product is specified for specific application. Manufacturer's recommendations may be contained in published product literature, or by manufacturer's certification of performance.
- E. Where specifications only require compliance with an imposed code, standard, or regulation, select product that complies with standards, codes or regulations specified.
- F. Where Specifications require matching an established Sample, Architect's decision will be final on whether proposed product matches satisfactorily. Where no product available within specified category matches satisfactorily nor complies with other specified requirements, refer to Architect.
- G. Where specified product requirements include phrase ` . . . *as selected from manufacturer's standard colors, patterns, textures . . .* ' or similar phrase, select product and manufacturer that comply with other specified requirements. Architect will select color, pattern, and texture from product line selected.

- H. Remove and replace products and materials not specified in Contract Documents but installed in the Work with specified products and materials at no additional cost to Owner and for no increase in Contract time.
- I. Informational Submittals:
  - 1. Sustainable Design Submittals:
    - a. Submit five copies of each required submittal unless otherwise required. Architect will return three copies marked with action taken and with corrections or modifications required.
    - b. Submit electronic files: PDF. Architect will return a PDF copy marked with action taken and with corrections or modifications required.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

**SECTION 01 6200**  
**PRODUCT OPTIONS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
1. Administrative and procedural requirements for Product Options.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Product Selection:
1. When option of selecting between two or more products is given, product selected will be compatible with products previously selected, even if previously selected products were also options.
- B. Non-Conforming Work:
1. Non-conforming work as covered in Article 12.3 of General Conditions applies, but is not limited, to use of non-specified products or manufacturers.
- C. Product selection is governed by Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include:
1. Substitutions And Equal Products:
    - a. Generally speaking, substitutions for specified products and systems, as defined in the Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
    - b. Approved Products / Manufacturers / Suppliers / Distributors / Fabricators / Installers:
      - 1) Category One:
        - a) Owner has established 'Relationships' that extend beyond requirements of this Project. No substitutions or equal products will be allowed on this Project.
        - b) Specification Sections specify Owner Furnished and Owner Installed Manufacturers or Products.
        - c) Follow specified procedures to preserve relationships between Owner and specified manufacturers / suppliers and advantages that accrue to Owner from those relationships.
      - 2) Category Two:
        - a) Owner has established 'Relationships' that contain provisions extending beyond requirements of this Project. No substitutions or equal products will be allowed on this Project.
        - b) Specification Sections specify Owner Furnished and Contractor Installed Manufacturers, Suppliers, Distributors or Products.
        - c) Follow specified procedures to preserve relationships between Owner and specified manufacturers / suppliers and advantages that accrue to Owner from those relationships.
      - 3) Category Three:
        - a) Owner has established 'Relationships' that contain provisions extending beyond requirements of this Project. Use these products to preserve advantages that accrue to Owner from those programs. No substitutions or equal products will be allowed on this Project.
        - b) Specification Sections specify Contractor Furnished and Contractor Installed Manufacturers, Suppliers, Distributors, Fabricators or Products.
      - 4) Category Four:

- a) Provide only specified products available from manufacturers listed. No substitutions, private-labeled, or equal products, or mixing of manufacturers' products is allowed on this Project.
- b) In Sections where lists recapitulating Manufacturers previously mentioned in Section are included under heading '*Manufacturers*' or '*Approved Manufacturers*', this is intended as a convenience to Contractor as a listing of contact information only. It is not intended that all manufacturers in list may provide products where specific products and manufacturers are listed elsewhere in Section.
- c. Acceptable Products / Manufacturers / Suppliers / Installers:
  - 1) Type One: Use specified products / manufacturers unless approval to use other products / manufacturers has been obtained from Architect by Addendum.
  - 2) Type Two: Use specified products / manufacturers unless approval to use other products and manufacturers has been obtained from Architect in writing before installing or applying unlisted or private-labeled products.
  - 3) Use 'Equal Product Approval Request Form' to request approval of equal products, manufacturers, or suppliers before bidding or before installation, as noted in individual Sections.
- d. Quality / Performance Standard Products / Manufacturers:
  - 1) Class One: Use specified product / manufacturer or equal product from specified manufacturers only.
  - 2) Class Two: Use specified product / manufacturer or equal product from any manufacturer.
  - 3) Products / manufacturers used shall conform to Contract Document requirements.

**PART 2 - PRODUCTS Not Used****PART 3 - EXECUTION Not Used****END OF SECTION**

**SECTION 01 6600****PRODUCT DELIVERY, STORAGE, AND HANDLING REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Product Delivery, Storage, and Handling Requirements.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Deliver, store, and handle products according to manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

**1.3 DELIVERY AND ACCEPTANCE REQUIREMENTS**

- A. Schedule delivery to reduce long-term storage at site and to prevent overcrowding of construction spaces.
- B. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
- C. Deliver products to site in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- D. Inspect products upon delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.

**1.4 STORAGE AND HANDLING REQUIREMENTS**

- A. Store products at site in manner that will simplify inspection and measurement of quantity or counting of units.
- B. Store heavy materials away from Project structure so supporting construction will not be endangered.
- C. Store products subject to damage by elements above ground, under cover in weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

**PART 2 - PRODUCTS Not Used****PART 3 - EXECUTION Not Used****END OF SECTION**

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**SECTION 01 7300**

**EXECUTION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for governing Execution of the Work.

**1.2 COMMON INSTALLATION PROVISIONS**

- A. Manufacturer's Instructions: Comply with Manufacturer's installation instructions and recommendations to extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents. Notify Architect of conflicts between Manufacturer's installation instructions and Contract Document requirements.
- B. Provide attachment and connection devices and methods necessary for securing Work. Secure work true to line and level. Anchor each product securely in place, accurately located, and aligned with other Work. Allow for expansion and building movement.
- C. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain best visual effect. Refer questionable choices to Architect for final decision.
- D. Install each component during weather conditions and Project status that will ensure best possible results. Isolate each part of completed construction from incompatible material as necessary to prevent deterioration.
- E. Coordinate temporary enclosures with required inspections and tests, to reduce necessity of uncovering completed construction for that purpose.
- F. Mounting Heights: Where mounting heights are not shown, install individual components at standard mounting heights recognized within the industry or local codes for that application. Refer questionable mounting height decisions to Architect for final decision.

**PART 2 - PRODUCTS Not Used**

**PART 3 - EXECUTION Not Used**

**END OF SECTION**

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**SECTION 01 7400****CLEANING AND WASTE MANAGEMENT****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Administrative and procedural requirements for Cleaning and Waste Management as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 01 1200: Coordination of responsibilities for waste management.
  - 2. Section 01 6400: Waste removal of Owner furnished products.
  - 3. In addition to standards described in this section, comply with all requirements for cleaning-up as described in various other Sections of these Specifications.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Asphalt Pavement, Brick, and Concrete (ABC) Rubble: Rubble that contains only weathered (cured) asphalt pavement, clay bricks and attached mortar normally used in construction, or concrete that may contain rebar. The rubble shall not be mixed with, or contaminated by, another waster or debris.
  - 2. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
  - 3. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
  - 4. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
  - 5. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
  - 6. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
  - 7. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

**PART 2 - PRODUCTS: Not Used****PART 3 - EXECUTION****3.1 PROGRESS CLEANING**

- A. Comply with regulations of authorities having jurisdiction and safety standards for cleaning.
- B. Keep premises broom clean during progress of the Work.
- C. Keep site and adjoining streets reasonably clean. If necessary, sprinkle rubbish and debris with water to suppress dust.
- D. During handling and installation, protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from soiling, damage, or deterioration until Substantial Completion.

- E. Clean and maintain completed construction as frequently as necessary throughout construction period. Adjust and lubricate operable components to ensure ability to operate without damaging effects.
- F. Supervise construction activities to ensure that no part of construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.
- G. Before and during application of painting materials, clear area where such work is in progress of debris, rubbish, and building materials that may cause dust. Sweep floors and vacuum as required and take all possible steps to keep area dust free.
- H. Clean exposed surfaces and protect as necessary to avoid damage and deterioration.
- I. Place extra materials of value remaining after completion of associated work have become Owner's property as directed by Owner or Architect.
- J. Construction Waste Management And Disposal:
  - 1. Remove waste materials and rubbish caused by employees, Subcontractors, and contractors under separate contract with Owner and dispose of legally. Remove unsuitable or damaged materials and debris from building and from property.
    - a. Provide adequate waste receptacles and dispose of materials when full.
    - b. Properly store volatile waste and remove daily.
    - c. Do not deposit waste into storm drains, sanitary sewers, streams, or waterways. Do not discharge volatile, harmful, or dangerous materials into drainage systems.
  - 2. Do not burn waste materials or build fires on site. Do not bury debris or excess materials on Owner's property.

### **3.2 FINAL CLEANING**

- A. Immediately before Substantial Completion, thoroughly clean building and area where The Work was performed. Remove all rubbish from under and about building, landscaped areas and parking lot and leave building and Project Site ready for occupancy by Owner.
- B. Comply with individual manufacturer's cleaning instructions.
- C. Clean each surface or unit to condition expected in normal, commercial building cleaning and maintenance program, including but not limited to:
  - 1. Interior Cleaning:
    - a. Remove marks, stains, fingerprints and dirt.
    - b. Clean and polish woodwork and finish hardware.
    - c. Remove labels that are not permanent labels.
    - d. Clean plumbing fixtures and tile work. Remove spots, soil or paint.
    - e. Clean surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.
    - f. Clean other fixtures and equipment and remove stains, paint, dirt, and dust.
    - g. Remove temporary floor protection and clean floors.
  - 2. Exterior Cleaning:
    - a. Remove marks, stains, and dirt from exterior surfaces.
    - b. Clean and polish finish hardware.
    - c. Remove temporary protection systems.
    - d. Clean dirt, mud, and other foreign material from paving, sidewalks, and gutters.
    - e. Clean drop inlets, through-curb drains, and other drainage structures.
    - f. Remove trash, debris, and foreign material from landscaped areas.

**END OF SECTION**

**SECTION 01 7700**  
**CLOSEOUT PROCEDURES**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Closeout Procedures.

**1.2 GENERAL**

- A. Closeout process consists of three specific project closeout inspections. Contractor shall plan sufficient time in construction schedule to allow for required inspections before expiration of Contract Time.
- B. Contractor shall conduct his own inspections of The Work and shall not request closeout inspections until The Work of the contract is reasonably complete and correction of obvious defects or omissions are complete or imminent.
- C. Date of Substantial Completion shall not occur until completion of construction work, unless agreed to by Architect and included on Certificate of Substantial Completion.

**1.3 PRELIMINARY CLOSEOUT REVIEW**

- A. When Architect, Owner and Contractor agree that project is ready for closeout, Pre-Substantial Inspection shall be scheduled.
- B. Prior to this inspection, completed test and evaluation reports for HVAC system is to be provided to Project Manager, Architect, and applicable consultants.
- C. Architect and his appropriate consultants, together with Contractor and mechanical, plumbing, and electrical sub-contractors shall conduct a space by space and exterior inspection to review materials and workmanship and to demonstrate that systems and equipment are operational.
  - 1. Punch list of items requiring completion and correction will be created.
  - 2. Time frame for completion of punch list items will be established, and date for Substantial Completion Inspection shall be set.

**1.4 SUBSTANTIAL COMPLETION INSPECTION**

- A. When Architect, Owner and Contractor agree that project is ready for Substantial Completion, an inspection is held. Punch list created at Pre-Substantial Inspection is to be substantially complete.
- B. Prior to this inspection, Contractor shall discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups and similar elements.
- C. Architect, Owner and Contractor review completion of punch list items. When Owner and Architect confirm that Contractor has achieved Substantial Completion of The Work, Owner, Architect and Contractor will execute Certificate of Substantial Completion that contains:
  - 1. Date of Substantial Completion.
  - 2. Punch List Work not yet completed, including seasonal and long lead items.
  - 3. Amount to be withheld for completion of Punch List Work.

4. Time period for completion of Punch List Work.
  5. Amount of liquidated damages set forth in Supplementary Conditions to be assessed if Contractor fails to complete Punch List Work within time set forth in Certificate.
- D. Contractor shall present Closeout Submittals to Architect and place tools, spare parts, extra stock, and similar items required by Contract Documents in locations as directed by Facilities Manager.

### **1.5 FINAL ACCEPTANCE MEETING**

- A. When punch list items except for any seasonal items or long lead items which will not prohibit occupancy are completed, Final Acceptance Meeting is held.
- B. Owner, Architect and Contractor execute Owner's Project Closeout - Final Acceptance form, and verify:
1. All seasonal and long lead items not prohibiting occupancy, if any, are identified, with committed to completion date and amount to be withheld until completion.
  2. Owner's maintenance personnel have been instructed on all system operation and maintenance as required by the Contract Documents.
  3. Final cleaning requirements have been completed.
- C. If applicable, once any seasonal and long lead items are completed, Closeout Inspection is held where Owner and Architect verify that The Work has been satisfactorily completed, and Owner, Architect and Contractor execute Closeout portion of the Project Closeout - Final Acceptance form.
- D. When Owner and Architect confirm that The Work is satisfactorily completed, Architect will authorize final payment.

### **PART 2 - PRODUCTS Not Used**

### **PART 3 - EXECUTION Not Used**

**END OF SECTION**

**SECTION 01 7800****CLOSEOUT SUBMITTALS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes But is Not Limited To:
  - 1. Administrative and procedural requirements for Closeout Submittals.
- B. Related Requirements:
  - 1. Section 01 3300: 'Submittal Procedures' for administrative and procedural requirements for submittal procedures.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Project Record Documents:
  - 1. Do not use record documents for construction purposes:
    - a. Protect from deterioration and loss in secure, fire-resistive location.
    - b. Provide access to record documents for Architect's reference during normal working hours.
  - 2. Maintain clean, undamaged set of Drawings:
    - a. Mark set to show actual installation where installation varies from the Work as originally shown.
    - b. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
    - c. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
    - d. Mark new information that is important to Owner, but was not shown on Drawings.
    - e. Note related Change Order numbers where applicable.
- B. As Built Record Drawings:
  - 1. As required in agreement with the Owner:
    - a. Architect will provide two full-size sets of prints of the As Built Record Drawings to the Facilities Management Office, printed from the updated AutoCAD drawing files that have been modified to show actual dimensions and location of equipment, material, utility lines, and other work as actually constructed, based upon information provided by Contractor. Architect will submit updated As Built Record Drawings in PDF (ISO32000 format) to Owner.
    - b. Architect will submit following:
      - 1) Updated AutoCAD as built record drawing files with associated plot style tables.

**1.3 CLOSEOUT SUBMITTALS**

- A. Operations And Maintenance Manual:
  - 1. General:
    - a. Include closeout submittal documentation as required by Contract Documentation.
    - b. Include workmanship bonds, final certifications, equipment check-out sheets, and similar documents.
    - c. Releases enabling Owner unrestricted use of The Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
    - d. Include Project photographs, damage or settlement survey, and similar record information required by Contract Documents.
    - e. Submittal Format:

- 1) Digital copies unless otherwise noted, required for each individual specification section that include 'Closeout Submittals'.
- 2) Include only closeout submittals as defined in individual specification section as required in Contract Documents.
2. Project Manual:
  - a. Copy of complete Project Manual including Addenda, Modifications as defined in General Conditions, and other interpretations issued during construction:
    - 1) Mark these documents to show variations in actual Work performed in comparison with text of specifications and Modifications.
    - 2) Show substitutions, selection of options, and similar information, particularly on elements that are concealed or cannot otherwise be readily discerned later by direct observation.
3. Maintenance Contracts:
  - a. Digital format only.
4. Operations and Maintenance Data:
  - a. Digital format only:
    - 1) Cleaning instructions.
    - 2) Maintenance instructions.
    - 3) Operations instructions.
    - 4) Equipment list.
    - 5) Parts list.
5. Warranty Documentation:
  - a. Digital format of final, executed warranties.
6. Record Documentation:
  - a. Digital format only.
    - 1) Certifications.
    - 2) Design Data.
    - 3) Manufacture Reports.
    - 4) Manufacturer's literature or cut sheets.
    - 5) Shop Drawings.
    - 6) Source Quality Control.
    - 7) Special Procedures.
    - 8) Testing and Inspection Agency Reports.
    - 9) Testing and Inspection Reports.

#### **1.4 MAINTENANCE MATERIAL SUBMITTALS**

- A. Submit item(s) required by Section 01 3300 'Submittal Procedures' and as defined in individual specification section if required in Contract Documents. Items may be provided at completion of Work or with Closeout Submittals.

#### **1.5 WARRANTIES**

- A. When written guarantees beyond one (1) year after substantial completion are required by Contract Documents, secure such guarantees and warranties properly addressed and signed in favor of Owner. Include these documents in Operations & Maintenance Manual(s) specified above.
- B. Delivery of guarantees and warranties will not relieve Contractor from obligations assumed under other provisions of Contract Documents.

#### **PART 2 - PRODUCTS Not Used**

#### **PART 3 - EXECUTION Not Used**

**END OF SECTION**

**DIVISION 02: EXISTING CONDITIONS**

**02 4000 DEMOLITION AND STRUCTURE MOVING**

02 4119 SELECTIVE STRUCTURE DEMOLITION

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**SECTION 02 4119****SELECTIVE STRUCTURE DEMOLITION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Demolition and removal of selected portions of building or structure.
  - 2. Salvage of existing items to be reused or recycled.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements' for salvage of existing electrical items to be reused or recycled removed by Owner.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. National Fire Protection Association / American National Standards Institute:
    - a. NFPA 241, 'Standard for Safeguarding Construction, Alteration, and Demolition Operations', 2013 Edition.
  - 2. American Society of Safety Engineers:
    - a. ASSE A10.6-2006, 'Safety Requirements for Demolition Operations'.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Storage or sale of removed items or materials will not be permitted on-site.
- B. Pre-Installation Conference:
  - 1. Before beginning Selective Demolition work, in addition to requirements of Section 01 3100, meet on site to confirm work to be demolished, items to be salvaged or reused, and coordination with Owner.
- C. Scheduling:
  - 1. Indicate detailed sequence of selective demolition and removal work, with starting and ending dates for each activity, on Schedule specified in Section 01 3200.

**1.4 SUBMITTALS**

- A. Informational Submittals:
  - 1. Special Procedure Submittals:
    - a. Inventory:
      - 1) After selective demolition is complete, submit list of items that have been removed and salvaged.

**1.5 QUALITY ASSURANCE**

- A. Regulatory Agency Sustainability Approvals:

1. Comply with governing EPA notification regulations before beginning selective demolition.
2. Comply with hauling and disposal regulations of authorities having jurisdiction.
3. Standards: Comply with ANSI A10.6 and NFPA 241.

## 1.6 FIELD CONDITIONS

### A. Existing Conditions:

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

## PART 2 - PRODUCTS: Not Used

## PART 3 - EXECUTION

### 3.1 EXAMINATION

#### A. Verification Of Conditions:

1. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
  - a. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

#### B. Evaluation And Assessment:

1. Hazardous Materials:
  - a. It is not expected that hazardous materials will be encountered in the Work. Identified hazardous materials will be removed by Owner before start of the Work.
  - b. If materials suspected of containing hazardous materials are encountered, do not disturb and immediately notify Architect.
2. Inventory and record condition of items to be removed and reinstalled and items to be removed and salvaged.
3. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure nature and extent of conflict. Promptly submit written report to Architect.
4. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
5. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

### 3.2 PREPARATION

#### A. Temporary Facilities:

1. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
2. Maintain fire-protection facilities in service during selective demolition operations.

#### B. Temporary Shoring:

1. Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
2. Strengthen or add new supports when required during progress of selective demolition.

#### C. Utility Services:

1. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
2. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - a. Arrange to shut off indicated utilities with utility companies.
  - b. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

### 3.3 SELECTIVE DEMOLITION

#### A. General:

1. Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
2. Demolish and remove existing construction only to extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - a. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
  - b. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - c. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
  - d. Maintain adequate ventilation when using cutting torches.
  - e. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  - f. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  - g. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  - h. Dispose of demolished items and materials promptly.

#### B. Selective Demolition Procedures For Specific Materials:

1. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
2. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
3. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

#### C. Removed and Salvaged Items:

1. Relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.
  - a. Clean salvaged items as directed by Owner.
  - b. Pack or crate items after cleaning. Identify contents of containers.
  - c. Store items in a secure area until delivery to Owner.
  - d. Transport items to Owner's storage area designated by Owner.
  - e. Protect items from damage during transport and storage.

#### D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.

3. Protect items from damage during transport and storage.
  4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain:
1. Protect construction indicated to remain against damage and soiling during selective demolition.
  2. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

### **3.4 CLEANING**

- A. General:
1. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations.
  2. Return adjacent areas to condition existing before selective demolition operations began.
- B. Waste Management:
1. Disposal of Demolished Materials:
    - a. Remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill. Do not burn demolished materials.
      - 1) Do not allow demolished materials to accumulate on-site.
      - 2) Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
      - 3) Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

**END OF SECTION**

**DIVISION 04: MASONRY**

**04 0100 MAINTENANCE OF MASONRY**

04 0121 UNIT MASONRY REPOINTING  
04 0131 UNIT MASONRY CLEANING

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**SECTION 04 0121****UNIT MASONRY REPOINTING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Remove existing mortar to specified depth, clean joints, and tuck-point as described in Contract Documents.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM C150/C150M-16, 'Standard Specification for Portland Cement'.
    - b. ASTM C207-06(2011), 'Standard Specification for Hydrated Lime for Masonry Purposes'.

**PART 2 - PRODUCTS****2.1 SYSTEM**

- A. Materials:
  - 1. Design Criteria:
    - a. Hydrated Lime: Meet requirements of ASTM C207, Type S.
    - b. Portland Cement: Meet requirements of ASTM C150/C150M-09, Type II, White (non-staining).
    - c. Aggregate:
      - 1) Match existing as much as possible.
      - 2) Generally, sand with rounded edges is preferred.
  - 2. Color:
    - a. Match existing mortar color unless otherwise agreed to.
    - b. This will generally require fresh mortar to be slightly darker than existing to compensate for natural bleaching with age.
  - 3. Water: Clean, drinkable.
- B. Mixes:
  - 1. Pointing mortar shall be softer or no harder than existing mortar. Unless agreed to otherwise, mix may be one part lime and 2 parts sand. Portland cement may be added up to 20 percent of total lime and sand. Use no admixtures.
  - 2. Mix dry ingredients, then add about half water and mix for five minutes. Add additional water slowly until proper consistency is reached. Use mortar within 30 minutes. Do not re-temper.

**PART 3 - EXECUTION****3.1 PERFORMANCE**

- A. Interface With Other Work: Coordinate work of this Section with general masonry cleaning so all, except final pointing, is completed before general masonry cleaning, if any.



- B. Remove mortar from joint 2-1/2 times deeper than joint width or one inch, whichever is greater, with hammer and cold chisel or other suitable hand tools. Do not use power tools unless it can be demonstrated to Architect's satisfaction that masonry surfaces will not be damaged.
- C. Clean joints with combination of water flushing and brushing with bristle brush.
- D. Work fresh mortar from 'hawk' to joint with jointing tool. First fill recessed areas, which are deeper than standard chiseled depth, and then proceed to fill raked joint using several layers of mortar and working tool in one direction only. Each layer of mortar shall be thumbprint hard before succeeding layer is applied. Where corners of face brick have eroded, it may be necessary to recess mortar to some degree in order to maintain consistent visual width of joints.
- E. Perform final tooling when mortar is thumbprint hard.

### **3.2 CLEANING**

- A. Clean face of masonry one to two hours after mortar has set.
  - 1. Use plain stiff bristle brush.
  - 2. If mortar has become too hard, use brush and plain water and wooden paddle or, if necessary, a chisel.
  - 3. If harsher cleaning methods are required, allow mortar to cure thirty (30) days before commencing.

**END OF SECTION**

**SECTION 04 0131****UNIT MASONRY CLEANING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Clean exterior masonry surfaces as described in Contract Documents.

**1.2 QUALITY ASSURANCE**

- A. Regulatory Agency Sustainability Approvals:
1. Adhere to applicable City, State, and Federal EPA laws and requirements.
  2. Require applicators to observe applicable Federal and State Agency, industry, and Manufacturer recommended safety regulations and precautions. Applicators shall wear safety goggles, rubber gloves, and plastic or rubber rain suits so as to avoid splash to skin or eyes.
- B. Qualifications:
1. Installers:
    - a. Applicators performing work of this section shall have five years' minimum experience using specified restorative cleaning techniques.
- C. Field Samples:
1. Fundamental consideration for selection of appropriate cleaning procedures shall be that materials and techniques adopted do minimal or no damage to masonry substrates while achieving desired degree of cleaning.
  2. Architect will approve location of test areas.
  3. Clean test areas with recommended specified cleaning material for inspection and approval of Architect.
  4. Conduct tests on each building exposure in unobtrusive locations on representative staining conditions.
  5. Tests shall employ cleansing operation and include evaluation of all surfaces to be cleaned.
  6. Test samples of adjacent non-masonry materials for possible reaction with cleaning materials.
  7. Test procedures shall include evaluation of materials and techniques proposed for protection of surrounding and adjacent non-masonry surfaces from cleaning solutions and rinse waters.
  8. Representative of Cleaning Materials Manufacturer shall be present during preparation and application of cleaning materials for all test areas.
  9. Do not begin full scale cleaning operations until Architect has approved cleaning results in test areas and application procedures.

**1.3 DELIVERY, STORAGE, AND HANDLING**

- A. Storage And Handling Requirements:
1. Purchase and store on site in factory sealed containers sufficient cleaning materials to complete Project.
  2. Containers shall be available for inspection.

**1.4 FIELD CONDITIONS**

- A. Ambient Conditions:

1. Conduct cleaning operations at time of year when treated masonry surfaces will have adequate time to thoroughly dry without fear of freezing. Do not perform masonry cleaning at temperatures below 40 deg F (4 deg C), or when local Weather Service reports indicate temperatures below 40 deg F (4 deg C) during ensuing 24 hours are imminent, unless heated rinse water will be used and if approved in writing by Architect.
2. Do not perform masonry cleaning during winds sufficiently strong to spread sprayed compound to adjacent unprotected surfaces.

## PART 2 - PRODUCTS

### 2.1 SYSTEM

#### A. Manufacturers:

1. Manufacturer Contact List:
  - a. Diedrich Technologies, Oak Creek, WI [www.diedrichtechnologies.com](http://www.diedrichtechnologies.com).
  - b. Sure Klean Products by ProSoCo Inc, Kansas City, KS [www.prosoco.com](http://www.prosoco.com).

#### B. Description:

1. This specification describes cleaning systems designed to effectively clean and restore exterior masonry surfaces.
2. Selection of specific cleaners to be used shall be dependent on type of substrate, its condition, and results of tests conducted at job site as specified below.
3. Sandblasting and use of non-proprietary acids, alkalis, powdered or liquid, is not permitted.
4. Application shall be in accordance with Manufacturer's recommendations and as approved in writing by Owner.

#### C. Materials:

1. Paint Stripper I:
  - a. Primarily for removal of graffiti, paint spills or drips, spray paints, inks and crayons. May be used for heavy-duty coatings, epoxies, urethanes, floor enamels and other chemically resistant coatings.
  - b. Type One Acceptable Products:
    - 1) Sure Klean 509 Paint Stripper.
    - 2) Diedrich 505 Special Coatings Stripper.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.
2. Paint Stripper II:
  - a. Formulated specifically for removal of certain types of latex and lacquer paints.
  - b. Type One Acceptable Products:
    - 1) Sure Klean 940 Paint Stripper.
    - 2) Diedrich 505, 505X.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.
3. Paint Stripper III:
  - a. For removing multiple layers of paint coatings and graffiti from exterior masonry surfaces.
  - b. Type One Acceptable Products:
    - 1) Sure Klean Heavy Duty Paint Stripper.
    - 2) Diedrich 606 Paint Remover.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.
4. Asphalt And Tar Remover:
  - a. For removal of asphalt / tar roofing spills, grease, hydraulic oil, motor oil, and other similar stains from masonry surfaces.
  - b. Type One Acceptable Products:
    - 1) Sure Klean Asphalt And Tar Remover.
    - 2) Diedrich 920 Asphalt And Tar Remover.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.
5. Prewash I:
  - a. Formulated for use with Restoration Cleaner I, Limestone Afterwash, and Restorer I.

- b. Acts as 'carbon solubilizer' and assists in removing heavy carbon encrustations from brick, terra cotta, sandstone, limestone, and most other masonry.
- c. Type One Acceptable Products:
  - 1) Sure Klean 766 Prewash.
  - 2) Diedrich 808 Limestone Prewash.
  - 3) Equals as approved by Architect before bidding. See Section 01 6200.
6. Prewash II:
  - a. For use on difficult to clean masonry where restoration cleaner alone does not do an adequate job of cleaning masonry surface.
  - b. Type One Acceptable Products:
    - 1) Sure Klean 792 Masonry Prewash.
    - 2) Diedrich 707X, 808X.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.
7. Restoration Cleaner I:
  - a. For removing atmospheric staining with heavy deposits of carbon and dirt, paint oxidation, embedded clay and mud stains, rust, smoke, and algae.
  - b. Effective on brick, granite, sandstone, unpolished marble, and most other types of masonry surfaces. Do not use on limestone surfaces.
  - c. Type One Acceptable Products:
    - 1) Sure Klean Restoration Cleaner.
    - 2) Diedrich 101G Restoration Cleaner.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.
8. Restoration Cleaner II:
  - a. For removing atmospheric staining from heavy deposits of carbon and dirt, paint oxidations, embedded clay and mud stains, rust, smoke, and algae.
  - b. Effective on brick, granite, sandstone, unpolished marble, and most other types of masonry surfaces. Do not use on limestone surfaces.
  - c. Provides triple strength cleaning action and is designed for cleaning extremely dirty and heavily carboned masonry surfaces typically found in large cities or high pollution areas.
  - d. Type One Acceptable Products:
    - 1) Sure Klean Heavy Duty Restoration Cleaner.
    - 2) Diedrich 101 Masonry Restorer.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.
9. Restorer:
  - a. For removing atmospheric and organic stains from high calcium based natural limestone, precast limestone, concrete, exposed aggregate, and similar masonry surfaces.
  - b. Type One Acceptable Products:
    - 1) Sure Klean Limestone Restorer.
    - 2) 202 New Masonry Detergent.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.
10. Limestone Prewash And Limestone Afterwash:
  - a. For removing heavy carbon, dirt, and other atmospheric stains from porous limestone surfaces.
  - b. Most appropriate for cleaning extremely old limestone surfaces and limestone structures in high pollution areas.
  - c. Type One Acceptable Products:
    - 1) Sure Klean Limestone Prewash and Sure Klean Limestone Afterwash.
    - 2) Diedrich 707X Limestone Cleaner Pre-Rinse and 707N Limestone Neutralizer After-Rinse.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.
11. Strippable Masking:
  - a. For protecting glass, non-porous metal, and polished stone surfaces from damaging effect of acidic cleaning materials. It is a liquid, film forming, strippable masking material.
  - b. Type One Acceptable Products:
    - 1) Sure Klean Strippable Masking.
    - 2) Diedrich Acid Guard.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.
12. Interior Stone Cleaner:
  - a. For removing smoke, soot, and other related surface stains from interior marble, limestone, granite, natural stones, slates, etc.

- b. Most appropriate for cleaning occupied stone buildings where strong corrosive cleaners and large amounts of water cannot be used.
  - c. Type One Acceptable Products:
    - 1) Sure Klean Interior Stone Cleaner.
    - 2) Diedrich 707 Interior Stone Cleaner.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.
13. Marble Cleaner:
- a. For removing surface dirt, carbon build-up and other atmospheric stains from marble, polished stone, and other glazed masonry.
  - b. Type One Acceptable Products:
    - 1) Sure Clean Liquid Marble Cleaner.
    - 2) Diedrich 910 PM Polished Interior Marble Cleaner.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.
14. Poultice:
- a. For removing deep-set oil, dirt, and other related stains from polished marble and stone.
  - b. For interior application.
  - c. Type One Acceptable Products:
    - 1) Sure Klean Marble Poultice.
    - 2) Diedrich General Purpose Poultice.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.
15. Aluminum Cleaner:
- a. For removing aluminum oxidation, atmospheric dirt, carbon, and other related surface stains from architectural aluminum.
  - b. Type One Acceptable Products:
    - 1) Sure Klean Aluminum Cleaner.
    - 2) Diedrich 970 Aluminum Cleaner.
    - 3) Equals as approved by Architect before bidding. See Section 01 6200.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Protection Of In-Place Conditions:
- 1. Provide covered access to building for public, employees, and service vehicles at all times.
  - 2. Protect, or avoid contact with, auto and pedestrian traffic.
  - 3. Protect aluminum, wood, and painted surfaces from exposure to cleaning solution. Also protect plants and shrubbery.
  - 4. Protect surrounding landscape and lawn areas from contact with cleaning solutions.
    - a. Landscape and lawn areas may be best protected by keeping them as wet as possible through use of lawn soaker hoses which provide a slow but steady mist of water to areas adjacent to masonry being cleaned.
    - b. Root systems of adjacent trees and shrubs exposed to cleaning rinse waters can be protected with use of neutralizing trenches.
  - 5. Protect non-masonry surfaces that are not to be replaced from contact with cleaning solution.
    - a. Protect wooden and painted surfaces with sheets of polyethylene or other proven protective materials, firmly fixed and sealed to surface.
    - b. Keep non-masonry surfaces, which are not protected, running-wet with clean water throughout cleaning process of adjacent masonries.
- B. Surface Preparation:
- 1. Complete paint stripping and cleaning procedures before installation of new window glazing and paint finishes. Failure to do so will make it necessary to protect such finishes from contact with cleaning and paint stripping agents.
  - 2. Test surfaces not to be cleaned for possible detrimental effects of cleaning solutions and protect as determined necessary by test results.
  - 3. Temporarily calk or otherwise protect open joints to prevent intrusion of washing waters into wall structure or building interior.

### 3.2 APPLICATION

#### A. General:

1. Any dilution of cleaning materials will be with clean water in accordance with instructions on Manufacturer's printed container label.
2. Surface Treatment:
  - a. Thoroughly pre-wet surfaces, which are to be treated with water soluble materials, with clean water before application of cleaning materials. Do not pre-wet surfaces to be cleaned with materials containing solvents, such as Paint Strippers I, II, and III, and Asphalt And Tar Remover.
  - b. Purpose of pre-wetting is to limit activity of cleaning solution to masonry surface and prevent cleaning solutions from being too readily absorbed by dry masonries. Failure to adequately pre-wet may result in streaking and other residual staining of treated masonries.
3. Pressure Application:
  - a. Use high pressure rinsing equipment for pre-wetting and rinsing procedures described below. Pressures of 400 to 800 psi (2.76 to 5.52 MPa) and a flow rate of 4 to 6 gallons (18 to 27 liters) per minute have proved most effective.
  - b. Use low-pressure spray application for cleaning materials. High pressure application may drive cleaning compounds deep into masonry surface making it impossible to rinse treated surfaces free of cleaning residues.
  - c. If spray application of cleaning solution is desired, apply cleaning agents with 50 psi (0.35 MPa) maximum spray equipment.
  - d. Equipment that can apply hot water shall be controllable so water temperatures do not exceed 160 deg F (71 deg C).
4. In areas of high public traffic, perform cleaning operations at night.
5. Rinse chemicals after appropriate dwell time using garden hose just before rinsing with high-pressure equipment.
6. Avoid cleaning at times of extreme or excessive winds.
7. When cleaning from scaffolding in traffic areas, drape scaffolding with plastic or burlap to reduce spray drift.
8. When working in an area of public foot traffic, build shed over sidewalk to protect pedestrian traffic.

#### B. Paint Stripper I:

1. Remove as much paint / stain matter as is practical with hand scrappers.
2. Using a natural fibered cleaning brush, roller or large paint brush, apply a heavy, thick coating of paint stripper to painted / stained areas.
3. Allow paint stripper to remain until paint / stain 'lifts' or shows signs of dissolving. Do not allow stripper to dry on surface.
4. Rinse treated surfaces thoroughly with fresh water using pressure washing equipment to remove paint stripper and dissolved paint/stain material.

#### C. Paint Stripper III:

1. Using synthetic fibered brush, roller, or appropriate spray equipment, apply a heavy, thick coating of paint stripper to painted surfaces. On surfaces that have multiple coats of paint, sufficient material should be applied to produce a 1/8 inch (3 mm) buildup of stripper on surface.
2. Allow paint stripper to remain on surface for 4 to 24 hours until paint is obviously dissolved. On surfaces that have received 15 to 20 coats of paint, second application of paint stripper directly over first application, before rinsing, will frequently improve efficiency of stripping operation.
3. Rinse treated surfaces thoroughly with fresh water using pressure washing equipment to remove all paint stripper and solubilized paint material.
4. Reapply as required to removal all traces of paint coatings.
5. When all paint has been removed, use a restoration cleaner to remove all traces of stripper and to clean exposed masonry.

#### D. Asphalt And Tar Remover:

1. Using densely packed masonry washing brush or low-pressure spray, apply Asphalt And Tar Remover liberally to dry masonry surface. When using spray application beware of drift and employ solvent resistant spraying devices.

2. Allow cleaning solution to stay on wall for several minutes.
  3. Reapply cleaning solution to stained areas with vigorous scrubbing manner with a stiff fibered masonry washing brush.
  4. Rinse treated surfaces thoroughly with fresh water employing full city water pressure or pressure washing equipment removing all cleaning compounds and staining matter.
  5. Allow masonry surfaces to thoroughly dry before determining cleaning results.
  6. Reapply as necessary.
- E. Prewash:
1. Apply heavy coating of Prewash to masonry surface using synthetic fiber brush or roller.
  2. Allow material to remain on surface until carbon stains are dissolved. Do not allow prewash to dry on surface.
  3. Rinse treated surfaces thoroughly with fresh water, employing pressure equipment removing all cleaning compound, dirt, etc.
  4. Apply a Restoration Cleaner to area treated using a natural fiber masonry washing brush or low pressure spray.
  5. Allow solution to dwell on surface three to five minutes depending on drying conditions. Do not allow cleaning solution to dry in.
  6. Rinse treated surfaces thoroughly with fresh water employing pressure washing equipment removing all cleaning compounds, dirt, stains, etc.
- F. Restoration Cleaner I:
1. Apply cleaning solution liberally to masonry surface using low-pressure spray or densely packed, soft fibered masonry washing brush.
  2. Allow cleaning solution to remain on wall for 3 to 5 minutes depending upon drying conditions. Do not allow cleaning solution to dry in.
  3. Reapply cleaning solution in a scrubbing manner.
  4. Rinse treated surfaces thoroughly with fresh water employing pressure washing equipment removing all cleaning compounds, dirt, etc.
  5. Reapply as necessary.
- G. Restoration Cleaner II:
1. Apply cleaning solution liberally to masonry surface using low-pressure spray or densely packed, soft fibered masonry washing brush.
  2. Allow cleaning solution to remain on wall for three to five minutes depending upon drying conditions. Do not allow cleaning solution to dry in.
  3. Reapply cleaning solution in a scrubbing manner.
  4. Rinse treated surfaces thoroughly with fresh water employing pressure washing equipment removing all cleaning compounds, dirt, etc.
  5. Reapply as necessary.
- H. Restorer:
1. Apply cleaning solution liberally to masonry surface using low-pressure spray or densely packed, soft fibered masonry washing brush.
  2. Allow cleaning solution to remain on wall for three to five minutes depending upon drying conditions. Do not allow cleaning solution to dry in.
  3. Reapply cleaning solution in a scrubbing manner.
  4. Rinse treated surfaces thoroughly with fresh water employing pressure washing equipment removing all cleaning compounds, dirt, etc.
  5. Reapply as necessary.
- I. Limestone Prewash / Afterwash:
1. Apply heavy coating of Limestone Prewash to masonry surface using synthetic fiber brush or roller.
  2. Allow material to remain on surface until carbon stains are dissolved. Do not allow cleaning solution to dry in.
  3. Rinse treated surfaces thoroughly with fresh water employing pressure washing equipment removing all cleaning compound, dirt, etc.
  4. Immediately apply solution of Afterwash as specified below.

5. Apply prepared solution (diluted two parts water to one part concentrated cleaner) to area treated using natural fiber masonry washing brush or low pressure spray.
  6. Allow solution to dwell on surface 3 to 5 minutes depending on drying conditions. Do not allow cleaning solution to dry in.
  7. Rinse treated surfaces thoroughly with fresh water employing pressure washing equipment removing all cleaning compounds, dirt, stain, etc.
- J. Strippable Masking:
1. Test surfaces to be coated to verify ease of removal before general application. Surfaces should be clean and free of contaminants.
  2. Using brush or roller:
    - a. Apply masking material so as to provide a build-up of 2.0 dry mils of coating.
  3. Allow masking to dry before exposing coating to cleaning application.
  4. Remove within 15 days (exterior) to 60 days (interior) by pulling corner of coating free of surface and continue to pull coating from surface.
- K. Marble Cleaner:
1. Apply concentrated cleaner to masonry surface using soft bristle nylon brush.
  2. Allow cleaner to remain on surface for 5 to 15 minutes and brush to remove all stains. Do not allow cleaner to dry.
  3. Rinse with clean water using pressure washer, garden hose, or brush and sponges, as condition will allow. Thoroughly rinse surface. Change rinse water frequently.
- L. Poultrice:
1. Mixing Procedures:
    - a. Pour **100 pounds (45 kg)** of poultrice into wheelbarrow or other suitable mixing container.
    - b. While mixing, slowly add enough water to bring mix to dry paste.
    - c. Add one to two pints, depending on desired mix consistency, of poultrice.
    - d. While mixing, slowly add additional water until poultrice mix is at desired troweling consistency.
    - e. Mixing proportions of poultrice additive should be from **one to two pints (0.6 to 1.2 liters)** of additive to **100 pounds (45 kg)** of poultrice. Precise amount of poultrice additive used will depend on desired plasticity of mixture.
  2. Application:
    - a. Apply **1/4 inch (6 mm)** thick coating of prepared poultrice mix to surface using plasterer's trowel or airless spray equipment.
    - b. Press light polyethylene film over poultriced area. Tape or otherwise seal off edges of poly film.
    - c. Allow film covered poultrice to remain on surface for 12 to 24 hours.
    - d. Remove protective film. Scrape off poultrice. Wash surface thoroughly with fresh water, using sponge or cloth.
    - e. Repeat poultrice procedures where necessary.
    - f. Polish clean surface with soft dry cloth. Use quality marble polish if desired.
- M. Aluminum Cleaner:
1. Pre-wet surface to be cleaned.
  2. Apply cleaning solution liberally to aluminum surface to be cleaned.
  3. Allow to remain on surface for approximately three minutes, then apply second coat in scrubbing manner.
  4. Immediately rinse with fresh water. Do not clean hot surfaces or surfaces exposed to direct sunlight.

### 3.3 CLEANING

- A. Remove and dispose of masking materials following completion of cleaning operation. Leave windows and non-masonry areas clean.



- B. Sweep or flush residue washed from building surface away from surrounding sidewalk and service areas nightly. Premises shall be clean and neat at all times.

**END OF SECTION**

## **DIVISION 05: METALS**

### **05 0500 COMMON WORK RESULTS OF METALS**

05 0503 SHOP-APPLIED METAL COATINGS  
05 0523 METAL FASTENINGS

### **05 5000 METAL FABRICATIONS**

05 5214 GALVANIZED STEEL PIPE AND TUBE RAILINGS

END OF TABLE OF CONTENTS

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**SECTION 05 0503****SHOP-APPLIED METAL COATINGS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Quality of factory or shop-applied priming applied to steel supplied to Project without finish coat.
  - 2. Quality of and procedures for field touch-up and repair of factory-applied priming.
- B. Related Requirements:
  - 1. Sections under 09 9000 heading: Finish painting.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM B695-04(2016), 'Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel'.

**1.3 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Product data and samples, if requested by Architect.

**PART 2 - PRODUCTS****2.1 FINISHES**

- A. Factory And Shop-Applied Primer:
  - 1. Compatible with and of equal or better quality than finish paint system to be applied by Sections under 09 9000 heading.
  - 2. Primer on unexposed, unfinished surfaces may be fabricator's standard shop coat.
- B. Repairs To Primed Surface:
- C. Unless otherwise specified, use primer which matches characteristics of original primer and is compatible with and of equal or better quality than finish paint system to be applied by Sections under 09 9000 heading.

**PART 3 - EXECUTION****3.1 PREPARATION**

- A. Surface Preparation:
  - 1. General:

- a. Clean, grind, or otherwise prepare welds in steel that is to be coated within limits acceptable to welder responsible for structural integrity.
  - b. Surfaces to be coated shall be clean, dry and free of oil, grease, and corrosion products.
2. Preparation Of Primed, Ungalvanized Surfaces:
- a. Clean welds and grind serious abrasions.

### 3.2 REPAIR / RESTORATION

- A. Repairs To Primed, Ungalvanized Surfaces:
1. Thoroughly clean metal and give one (1) prime coat of specified material, well-worked into metal joints and open spaces. Match existing primed finish as required.
    - a. Do not apply primer at temperatures below 45 deg F (7 deg C).
    - b. Protect un-primed machine-finished surfaces against corrosion by priming.

**END OF SECTION**

**SECTION 05 0523****METAL FASTENING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Quality of structural metal-to-metal, wood-to-metal, and wood-to-wood bolts used on Project.
  - 2. Requirements and standards for site welded metal-to-metal connections.
- B. Related Requirements:
  - 1. Section 03 1511: 'Concrete Anchors And Inserts' for cast-in-place and drilled-in anchor bolts.
  - 2. Furnishing and installing of structural bolts specified under Section concerned.
  - 3. Performance of welding specified under Section concerned.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. American National Standards Institute / American Welding Society:
    - a. ANSI/AWS D1.1/D1.1M:2015, 'Structural Welding Code - Steel'.
    - b. ANSI/AWS D1.3/D1.3M:2018, 'Structural Welding Code - Sheet Steel'.
  - 2. ASTM International:
    - a. ASTM A307-14, 'Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength'.

**1.3 QUALITY ASSURANCE**

- A. Qualifications: Requirements of Section 01 4301 applies, but not limited to the following:
  - 1. Welders shall be certified 30 days minimum before beginning work on Project. If there is doubt as to proficiency of welder, Architect may require welder to take another test, at no expense to Owner. Certification shall be by Pittsburgh Laboratories or other authority approved by Architect.
- B. Certifications:
  - 1. Maintain welder's certifications on job-site.

**PART 2 - PRODUCTS****2.1 MANUFACTURED UNITS**

- A. Materials:
  - 1. Bolts And Threaded Fasteners:
    - a. Bolts: Conform to requirements of ASTM A307, Grade A.

**2.2 ACCESSORIES**

- A. Arc-Welding Electrodes: Type E70XX AWS Iron and Steel Arc-welding electrodes and meeting current AISC Specifications.

**PART 3 - EXECUTION**

**3.1 PERFORMANCE**

- A. Welding shall meet requirements of ANSI / AWS D1.1 and D1.3.
- B. Minimum weld sizes, unless detailed otherwise.
  - 1. Weld pipe columns to base plates and top plates with 1/4 inch (6 mm) fillet weld all around.

**END OF SECTION**

**SECTION 05 5214****GALVANIZED STEEL PIPE AND TUBE RAILINGS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install steel pipe guardrails to existing guardrails in upper mechanical room as described in Contract Documents.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Anchoring sleeves in concrete (if used).
- C. Related Requirements:
  - 1. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of priming and repair of galvanizing.
  - 2. Section 05 0523: 'Metal Fastening' for quality of welding.
  - 3. Section 06 1100: 'Wood Framing' for blocking for handrail brackets installed on wood-framed walls.
  - 4. Finish painting:
    - a. Section 09 9124: 'Interior Painted Metal'.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Galvanized: To coat iron or steel with zinc for protection from rust and corrosion.
  - 2. Non-shrink Grout: Structural grout used for filling voids between elements that is formulated with cement, fine aggregates and admixtures. Admixtures are used to provide expansive properties of the material during curing. This expansion counteracts the natural tendency of cement grouts to shrink during curing.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A53/A53M-18, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'.
    - b. ASTM A501/A501M-14, 'Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing'.
    - c. ASTM C1107/C1107M-17, 'Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)'.

**1.3 SUBMITTALS**

- A. Action Submittals:
  - 1. Shop Drawings: Show fabrication and installation of handrails and railings including floor plans, elevations, sections, details of components, and attachments to other elements of The Work.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Storage And Handling Requirements:
  - 1. Store guardrails and railing systems in clean, dry location, away from uncured concrete and masonry, and protected against damage.



2. Cover with waterproof paper, tarpaulin, or polyethylene sheeting. Allow for air circulation inside covering.

## PART 2 - PRODUCTS

### 2.1 ASSEMBLIES

#### A. Materials:

1. Handrails, Railings, And Balusters:
  - a. Steel pipe meeting requirements of ASTM A53/A53M or steel tubing meeting requirements of ASTM A501/A501M.
  - b. 1-1/2 inch (38 mm) outside diameter.
2. Sleeves:
  - a. 6 to 9 inches (150 to 225 mm) long with cross-section shape and dimension to allow 1/2 inch (12.7 mm) minimum of grout around perimeter of pipe or tube.
  - b. Provide with fully welded steel plate forming bottom closure.
3. Brackets, Flanges, Fittings, And Anchors:
  - a. Provide standard wall brackets, flanges, miscellaneous fittings, and anchors for connection of handrails and railings to other construction.
  - b. Provide inserts and other anchorage devices for connecting handrails and railing systems to concrete or masonry work.

#### B. Fabrication:

1. Preassemble railing systems in shop to greatest extent possible to minimize field splicing and assembly.
2. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
3. Grind smooth welded joints and buff welds to same appearance as remainder of railing. Repair galvanizing and cut pipe ends as specified in Section 05 0503.
4. Form curves by bending pipe in jigs to produce uniform curvature for each configuration required. Maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.
5. Welded Connections:
  - a. Fabricate railing system and handrail connections by welding.
  - b. Weld corners and seams continuously to comply with following:
    - 1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
    - 2) At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.
    - 3) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and so contours of welded surfaces match adjacent surfaces.
6. Return pipe ends of wall mounted handrails into wall.
7. Cap pipe ends of floor / ground mounted handrails and exterior handrails.
8. After fabrication, shop prime metal to be painted.

### 2.2 ACCESSORIES

#### A. Rail Setting Grout:

1. Commercial nonshrink grout conforming to requirements of ASTM C1107/C1107M, Type B or Type C.
2. Type Two Approved Manufacturers:
  - a. Normal Construction Grout A by Bonsal American, Charlotte, NC [www.bonsal.com](http://www.bonsal.com).
  - b. Advantage 1107 Grout by Dayton Superior Specialty Chemicals, Kansas City, KS [www.daytonsuperiorchemical.com](http://www.daytonsuperiorchemical.com).

- c. NS Grout by Euclid Chemical Co, Cleveland, OH [www.euclidchemical.com](http://www.euclidchemical.com)
- d. 5 Star Special Grout 110 by Five Star Products Inc, Fairfield, CT [www.fivestarproducts.com](http://www.fivestarproducts.com).
- e. Duragrout by L&M Construction Chemicals Inc, Omaha, NE [www.lmcc.com](http://www.lmcc.com)
- f. Sonneborn / BASF Building Systems, Shakopee, MN [www.chemrex.com](http://www.chemrex.com).
- g. Tamms Grout 621 by TAMMS Industries, Mentor, OH [www.tamms.com](http://www.tamms.com).
- h. U S Spec MP Grout by U S Mix Products Co [www.usspec.com](http://www.usspec.com).
- i. CG-86 Grout by W R Meadows, Hampshire, IL [www.wrmeadows.com](http://www.wrmeadows.com).
- j. Equal as approved by Architect before use. See Section 01 6200.

**PART 3 - EXECUTION**

**END OF SECTION**

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## **DIVISION 06: WOOD, PLASTICS, AND COMPOSITES**

### **06 0500 COMMON WORK RESULTS OF WOOD, PLASTICS, AND COMPOSITES**

06 0573 PRESERVATIVE WOOD TREATMENT

### **06 1000 ROUGH CARPENTRY**

06 1011 WOOD FASTENINGS  
06 1100 WOOD FRAMING  
06 1636 WOOD PANEL PRODUCT SHEATHING  
06 1712 STRUCTURAL COMPOSITE LUMBER: SCL

### **06 2000 FINISH CARPENTRY**

06 2001 COMMON FINISH CARPENTRY REQUIREMENTS  
06 2024 DOOR, FRAME, AND FINISH HARDWARE INSTALLATION  
06 2210 MISCELLANEOUS WOOD TRIM

### **06 4000 ARCHITECTURAL WOODWORK**

06 4001 COMMON ARCHITECTURAL WOODWORK REQUIREMENTS  
06 4512 ARCHITECTURAL WOODWORK WOOD TRIM

END OF TABLE OF CONTENTS

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**SECTION 06 0573****PRESERVATIVE WOOD TREATMENT****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Quality of wood preservative treatment where specified.
- B. Related Requirements:
  - 1. Section 06 1100:
    - a. Characteristics of wood to be pressure-treated.
    - b. Furnishing and installing of pressure-treated wood.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Preservative-Treated Wood: Wood exposed to high levels of moisture or heat susceptible to decay by fungus and other organisms, and to insect attack. The damage caused by decay or insects can jeopardize the performance of the wood members so as to reduce the performance below that required. Preservative treatment requires pressure-treatment process to achieve depth of penetration of preservative into wood to verify that the wood will be resistant to decay and insects over time.
  - 2. Treated Wood: Wood impregnated under pressure with compounds that reduce its susceptibility to flame spread or to deterioration caused by fungi, insects, or marine bores.
- B. Reference Standards:
  - 1. American Wood Protection Association:
    - a. AWPA P5-10. 'Standard For Waterborne Preservatives'.
    - b. AWPA P22-10. 'Standard For Ammoniacal Copper Zinc Arsenate (ACZA)'.
    - c. AWPA P51-10, 'Standard for Zinc Borate (ZB)'.
    - d. AWPA T1-12, 'Use Category System: Processing and Treatment Standard For Treated Wood'.
    - e. AWPA U1-12, 'Use Category System: User Specification For Treated Wood'.
  - 2. International Building Code (IBC) (2018 or most recent edition adopted by AHJ):
    - a. Chapter 23, 'Wood':
      - 1) Section 2300, 'Minimum Standards and Quality':
        - a) 2303.1, 'General':
          - (1) 2303.1.8, 'Preservative-Treated Wood'.
      - 2) Section 2400, 'General Construction Requirements':
        - a) 2304.11, 'Protection Against Decay and Termites':
          - (1) 2311.2, 'Wood Used Above Ground'.
          - (2) 2311.4, 'Wood In Contact With The Ground'.

**1.3 SUBMITTALS**

- A. Informational Submittals:
  - 1. Certificate: Certificate of pressure treatment showing compliance with specification requirements and including information required under IBC Section 2303.1.8.1, 'Identification'.

**PART 2 - PRODUCTS****2.1 SYSTEMS****A. Manufacturers:**

1. Type One Acceptable Manufacturers:
  - a. Arch Wood Protection Inc, Atlanta, GA [www.wolmanizedwood.com](http://www.wolmanizedwood.com).
  - b. Hoover Treated Wood Products, Thomson, GA [www.frtw.com](http://www.frtw.com).
  - c. Osmose Inc, Griffin, GA [www.osmose.com](http://www.osmose.com).
  - d. U S Borax Inc, Valencia, CA [www.borax.com/wood](http://www.borax.com/wood).
  - e. Viance LLC, Charlotte, NC [www.treatedwood.com](http://www.treatedwood.com).
  - f. Equal as approved by Architect before bidding. See Section 01 6200.

**B. Performance:**

1. Framing lumber grade and species shall be as specified in Section 06 1100 for particular use.
2. Interior Wood In Contact With Concrete or Masonry:
  - a. Preservatives:
    - 1) Disodium octoborate tetrahydrate (DOT / SBX) meeting requirements of AWPA U1 and with retention of **0.25 lbs per cu ft (4 kg per cu meter)**.
    - 2) Zinc borate meeting requirements of AWPA U1 and with retention of **0.17 lbs per cu ft (2.7 kg per cu meter)**.
    - 3) CCA-C (47.5 percent chromium trioxide, 18.5 percent copper oxide and 34 percent arsenic pentoxide) by Koppers Performance Chemicals, Griffin, Georgia, <http://www.koppersperformancechemicals.com/> (0.25 lb/cu ft minimum retention).
    - 4) DURA-GUARD by Hoover Treated Wood Products, Thomson, GA [www.frtw.com](http://www.frtw.com) (.40 lb/cu ft minimum retention).
  - b. Lumber: Treat in accordance with AWPA U1.
3. Exterior Wood Continuously Exposed To Weather:
  - a. Preservatives: Waterborne preservatives meeting requirements of AWPA U1 with retention levels as required by AWPA U1 for specific application.
  - b. Lumber: Treat in accordance with AWPA U1.

**PART 3 - EXECUTION: Not Used****END OF SECTION**

**SECTION 06 1011****WOOD FASTENINGS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Quality of wood fastening methods and materials used for Rough Carpentry unless specified otherwise.
- B. Related Requirements:
1. Section 05 0523: 'Metal Fastenings' for Quality of bolts used for Rough Carpentry.
  2. Furnishing and installing of other fasteners are specified in individual Sections where installed.

**1.2 REFERENCES**

- A. Reference Standards;
1. ASTM International:
    - a. ASTM A153/A153M-16a, 'Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware'.
    - b. ASTM D3498-18, 'Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems'.
    - c. ASTM F1667-18a, 'Standard Specification for Driven Fasteners: Nails, Spikes, and Staples'.

**1.3 SUBMITTALS**

- A. Action Submittals:
1. Product Data:
    - a. Manufacturer's literature on framing anchors and powder actuated fasteners.

**PART 2 - PRODUCTS****2.1 MANUFACTURED UNITS**

- A. Description:
1. Nail Terminology:
    - a. When following nail terms are used in relation to this Project, following lengths and diameters will be understood. Refer to nails of other dimensions by actual length and diameter, not by one of listed terms:

Nail Term	Length	Diameter	Length	Diameter
8d Box	2-1/2 inches	0.113 inch	63.5 mm	2.827 mm
8d Common	2-1/2 inches	0.131 inch	63.5 mm	3.389 mm
10d Box	3 inches	0.128 inch	76.2 mm	3.251 mm
10d Common	3 inches	0.148 inch	76.2 mm	3.759 mm
16d Box	3-1/2 inches	0.135 inch	88.9 mm	3.411 mm
16d Sinker	3-1/4 inches	0.148 inch	82.6 mm	3.759 mm
16d Common	3-1/2 inches	0.162 inch	88.9 mm	4.115 mm



- B. Materials:
1. Fasteners:
    - a. General:
      - 1) Fasteners for preservative treated and fire-retardant-treated wood shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronzed, or copper. Coating weights for zinc-coated fasteners shall be in accordance with ASTM A153/A153M.
    - b. Nails:
      - 1) Meet requirements of ASTM F1667.
      - 2) Unless noted otherwise, nails listed on Drawings or in Specifications shall be common nail diameter, except 16d nails, which shall be box diameter.
    - c. Wood Screws:
      - 1) SDS Screws:
        - a) Category Four Approved Products. See Section 01 6200 for definitions of categories.
          - (1) SDS Screws by Simpson Strong Tie Co, Dublin, CA [www.strongtie.com](http://www.strongtie.com).
        - 2) All Other: Standard type and make for job requirements.
    - d. Powder-Actuated Fasteners:
      - 1) Type One Quality Standard: Hilti X-DNI 62P8.
      - 2) Manufacturers:
        - a) Hilti, Tulsa, OK [www.us.hilti.com](http://www.us.hilti.com).
        - b) Redhead Division of ITW, Wood Dale, IL [www.itw-redhead.com](http://www.itw-redhead.com) and Markham, ON [www.itwconstruction.ca](http://www.itwconstruction.ca).
        - c) Equals as approved by Architect through shop drawing submittal before installation. See Section 01 6200.
  2. Adhesives:
    - a. Construction Mastics:
      - 1) Meet requirements of 'APA-The Engineered Wood Association' Specification AFG-01 or ASTM D3498.
      - 2) Use phenol-resorcinol type for use on pressure treated wood products.
  3. Framing Anchors:
    - a. Framing anchors and associated fasteners in contact with preservative hot dipped zinc-coated galvanized steel or stainless steel. Do not use stainless steel items with galvanized items.
    - b. Type Two Acceptable Products:
      - 1) KC Metals Inc, San Jose, CA [www.kcmetals.com](http://www.kcmetals.com).
      - 2) Simpson Strong Tie Co, Dublin, CA [www.strongtie.com](http://www.strongtie.com).
      - 3) United Steel Products Co Inc (USP), Montgomery, MN [www.uspconnectors.com](http://www.uspconnectors.com).
      - 4) Equals as approved by Architect through shop drawing submittal before installation. See Section 01 6200.

## PART 3 - EXECUTION

### 3.1 ERECTION

- A. Secure one Manufacturer approved fastener in each hole of framing anchor that bears on framing member unless approved otherwise in writing by Architect.
- B. Provide washers with bolt heads and with nuts bearing on wood.

**END OF SECTION**

**SECTION 06 1100****WOOD FRAMING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install wood framing and blocking as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Miscellaneous structural steel elements.
  - 2. Roof related blocking, wood nailers, and curbs.
  - 3. Structural composite lumber.
  - 4. Wood panel product sheathing.
- C. Related Requirements:
  - 1. Section 05 1223: 'Structural Steel For Buildings' for furnishing of miscellaneous structural steel.
  - 2. Section 06 0573: 'Preservative Wood Treatment' for quality of preservative wood treatment.
  - 3. Section 06 1636: 'Wood Panel Product Sheathing' for:
    - a. Pre-installation conference held jointly with Section 06 1100.
  - 4. Section 06 1712: 'Structural Composite Lumber - SCL'.
  - 5. Sections under 06 4000 Heading: 'Architectural Woodwork' for wall blocking requirements.
  - 6. Sections in Division 07: Roofing membranes for related blocking, wood nailers, and curbs.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. American Lumber Standard Committee (ALSC) (Maintains NIST standard):
    - a. Voluntary Product Standard:
      - 1) PS 20-15, 'American Softwood Lumber Standard'.
  - 2. National Institute of Standards and Technology (NIST), U. S. Department of Commerce:
    - a. Voluntary Product Standard DOC PS 20-15, 'American Softwood Lumber Standard'.
- B. Reference Standards:

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conference:
  - 1. Participate in MANDATORY pre-installation conference held jointly with Section 06 1636.
    - a. Schedule pre-installation conference immediately before beginning framing work.
    - b. In addition to agenda items specified in Section 01 3100, review following:
      - 1) Equipment and gypsum board blocking in wood framed walls.
      - 2) Rough opening.
      - 3) Nails and nailing requirements.
      - 4) Connections.

**1.4 SUBMITTALS**

- A. Informational Submittals:
  - 1. Test And Evaluation Reports:

- a. Technical and engineering data on nails to be set by nailing guns for Architect's approval of types proposed to be used as equivalents to specified hand set nails and adjusted number and spacing of pneumatically-driven nails to provide equivalent connection capacity.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  1. Protect lumber and sheathing and keep under cover in transit and at job site.
  2. Do not deliver material unduly long before it is required.
- B. Storage And Handling Requirements:
  1. Store lumber and sheathing on level racks and keep free of ground to avoid warping.
  2. Stack to insure proper ventilation and drainage.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Dimension Lumber:
  1. Design Criteria:
    - a. Meet requirements of PS 20 and National Grading Rules for softwood dimension lumber.
    - b. Bear grade stamp of WWPA, SPIB, or other association recognized by American Lumber Standards Committee identifying species of lumber by grade mark or by Certificate of Inspection.
    - c. Lumber **2 inches (50 mm)** or less in nominal thickness shall not exceed 19 percent in moisture content at time of fabrication and installation and be stamped 'S-DRY', 'K-D', or 'MC15'.
    - d. Preservative Treated Plates / Sills:
      - 1) **2x4 (38 mm by 64 mm)**: Standard and better Douglas Fir, Southern Pine, or HemFir, or StrandGuard by iLevel by Weyerhaeuser Boise, ID [www.ilevel.com](http://www.ilevel.com). (LSL 1.3 E)
      - 2) **2x6 (38 mm by 140 mm)** And Wider: No. 2 or or MSR 1650f - 1.5e Douglas Fir, Southern Pine, HemFir, or StrandGuard by iLevel by Weyerhaeuser, Boise, ID [www.ilevel.com](http://www.ilevel.com). (LSL 1.3 E).
- B. Posts, Beams, And Timbers **5 Inches by 5 Inches (125 mm by 125 mm)** And Larger:
  1. Design Criteria:
    - a. No. 1 or better Douglas Fir or Southern Pine.
- C. Lumber Ledgers:
  1. Design Criteria:
    - a. No. 2 Douglas Fir-Larch, or Southern Pine.
- D. See Contract Drawings for additional requirements.

### 2.2 ACCESSORIES

- A. Blocking:
  1. Sound lumber without splits, warps, wane, loose knots, or knots larger than **1/2 inch (13 mm)**.
- B. Furring Strips:
  1. Utility or better.
- C. Sill Sealer:
  1. Closed-cell polyethylene foam, **1/4 inch (6 mm)** thick by width of plate.

## PART 3 - EXECUTION

### 3.1 INSTALLERS

- A. Approved Installers. See Section 01 4301.

### 3.2 INSTALLATION

A. General:

1. Use preservative treated wood for wood members in contact with concrete or masonry, including wall, sill, and ledger plates, door and window subframes and bucks, etc.

B. Interface With Other Work:

1. Coordinate with other Sections for location of blocking required for installation of equipment and building specialties. Do not allow installation of gypsum board until required blocking is in place.
2. Where manufactured items are to be installed in framing, provide rough openings of dimensions within tolerances required by manufacturers of such items. Confirm dimensions where not shown on Contract Drawings.

C. Tolerances:

1. Walls:
  - a. 1/4 inch (6 mm) in 20 feet (6 meters), non-cumulative in length of wall.
  - b. 1/8 inch (3 mm) in 10 feet (3 meters) with 1/4 inch (6 mm) maximum in height of wall.
  - c. Distances between parallel walls shall be 1/4 inch (6 mm) maximum along length and height of wall.

D. Floors:

1. Place with crown side up.
2. Provide accurately fitted header and trimmer joists of same size as regular joists around floor openings, unless detailed otherwise, and support by steel joist hangers.
3. Double joists under partitions that parallel run of joists.

E. Walls:

1. Openings: Single, bearing stud supporting header and one adjacent (king) stud continuous between top and bottom plates, unless shown otherwise.
2. Corners And Partition Intersections: Triple studs.
3. Top Plates In Bearing Partitions: Doubled or tripled and lapped. Stagger joints at least 48 inches (1 200 mm).
4. Stud Walls To Masonry. Use one of the following methods:
  - a. Connect with 1/2 inch (13 mm) machine bolts 6 inches (150 mm) from top, 6 inches (150 mm) from bottom, and 48 inches (1 200 mm) maximum on center. Use three bolts minimum in height of 6 foot (1 800 mm) or higher wall.
  - b. Secure wood to masonry using continuous 1/4 inch (6 mm) minimum bead of construction adhesive and powder actuated fasteners installed at 32 inches (800 mm) on center minimum.
5. Firestops:
  - a. Horizontal or vertical concealed spaces in walls, light coves, soffits, drop ceilings, and other features over 10 feet (3 000 mm) in length or height, and at stairs, ceiling levels, floor levels, and other junctures of horizontal to vertical concealed spaces.
  - b. Within concealed spaces of exterior wall finishes and exterior architectural elements, such as trims, cornices or projections, at maximum intervals of 20 feet (6 000 mm), length or height.
6. Sill Plates:
  - a. Shear Walls And Bearing Walls:
    - 1) Provide specified anchor 12 inches (300 mm) maximum and 4 inches (100 mm) minimum from each end of each plate.
    - 2) Shear Walls: Fasten with anchor bolts embedded in concrete or with screw anchors.

- 3) Bearing Walls: Fasten with anchor bolts embedded in concrete, or with screw anchors or expansion bolts in drilled holes.
  - b. Non-Structural Walls: Fasten with powder actuated fasteners.
  - c. In addition to requirements of paragraphs 'a' and 'b' above, set sill plates of interior walls measuring less than **36 inches (900 mm)** in length in solid bed of specified construction adhesive, except where sill sealer is used.
  - d. Install specified seal sealer under sill plates of exterior walls of main building and of acoustically insulated interior walls.
7. Posts And Columns:
- a. Unless shown otherwise, nail members of multiple member columns together with 16d at **6 inches (150 mm)** on center from each side.
8. Beams And Girders:
- a. Built-Up Members:
    - 1) Stagger individual members of multiple span beams and girders so, over any one support, no more than half the members will have a joint. In all cases, however, joints shall occur over supports.
    - 2) Unless shown otherwise on Drawings, nail two-ply built-up members with 10d nails **12 inches (300 mm)** on center top and bottom, staggered on opposite sides. Nail three-ply built-up members with 16d nails at **12 inches (300 mm)** on center, top and bottom, staggered, on opposite sides. Set with crown edge up with full bearing at ends and intermediate supports.
  - b. Pre-Fabricated Members:
    - 1) Solid glu-lam, LVL, LSL, or PSL members may be used in place of built-up **2x (38 mm)** framing members. Size shall be same as built-up member.
    - 2) Solid LVL or PSL members may be used in place of built-up LVL members. Size shall be same as sum of built-up members.
  - c. Wood shims are not acceptable under ends.
  - d. Do not notch framing members unless specifically shown in Drawing detail.
9. Nailing:
- a. Stud to plate (coordinate with Contract Drawings):

<b>2 by 4 inch nominal</b>	<b>38 by 89 mm</b>	End nail, two 16d OR toe nail, four 8d
<b>2 by 6 inch nominal</b>	<b>38 by 140 mm</b>	End nail, three 16d OR toe nail, four 8d
<b>2 by 8 inch nominal</b>	<b>38 by 184 mm</b>	End nail, four 16d OR toe nail, six 8d
<b>2 by 10 inch nominal</b>	<b>38 by 235 mm</b>	End nail, five 16d OR toe nail, six 8d
<b>1-3/4 by 5-1/2 inch LVL</b>	<b>44 by 140 mm LVL</b>	End nail, three 16d OR toe nail, four 8d
<b>1-3/4 by 7-1/4 inch LVL</b>	<b>44 by 184 mm LVL</b>	End nail, four 16d OR toe nail, six 8d
<b>1-3/4 by 9-1/4 inch LVL</b>	<b>44 by 235 mm LVL</b>	End nail, five 16d OR toe nail, six 8d
<b>1-3/4 by 11-1/4 inch LVL</b>	<b>44 by 286 mm LVL</b>	End nail, six 16d OR toe nail eight 8d

- b. Top plates: Spiked together, 16d, **16 inches (400 mm)** on center.
  - c. Top plates: Laps, lap members **48 inches (1200 mm)** minimum and nail with 16d nails **4 inches (100 mm)** on center
  - d. Top plates: Intersections, three 16d.
  - e. Backing And Blocking: Three 8d, each end.
  - f. Corner studs and angles: 16d, **16 inches (400 mm)** on center.
- F. Ceiling Framing:
1. Place with crown side up at **16 inches (400 mm)** on center unless noted otherwise.
  2. Install structural blocking and bridging as necessary and as described in Contract Documents.
  3. Special Requirements:
    - a. Ceiling Joists: Lap joists **4 inches (100 mm)** minimum and secure with code approved framing anchors.
  4. Installation of Structural Composite Lumber:
    - a. Install temporary horizontal and cross bracing to hold members plumb and in safe condition until permanent bracing is installed.
    - b. Install permanent bracing and related components before application of loads to members.
  5. Secure headers and header backing to structure as described in Contract Documents.

- G. Accessory / Equipment Mounting And Gypsum Board Back Blocking (nailers) for Wood Framing:
  - 1. Furnish and install blocking in wood framing required for hardware, specialties, equipment, accessories, and mechanical and electrical items, etc.
  
- H. Accessory / Equipment Mounting And Standing & Running Trim Blocking (nailers) for Metal Framing:
  - 1. Furnish and install blocking in wood framing required for hardware, specialties, equipment, accessories, and mechanical and electrical items, etc.
  - 2. Attach blocking not installed with clips with two fasteners in each end of each piece of blocking.
  
- I. Furring Strips:
  - 1. On Wood or Steel: Nail or screw as required to secure firmly.
    - a. Ceiling:
      - 1) Attach furring strips to the underside of structural elements with #8 wood screws, of length to penetrate wood framing **1 inch (25 mm)** minimum.
  - 2. On Concrete or Masonry:
    - a. Back up furring strips on exterior walls or walls in contact with earth with **15 lb (6.8 kg)** felt strip.
    - b. Nail at **12 inches (300 mm)** on center maximum.

**END OF SECTION**

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**SECTION 06 1636****WOOD PANEL PRODUCT SHEATHING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install wood panel product sheathing required for walls and floors as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 01 0000: 'General Requirements':
  - 2. Section 06 1100: 'Wood Framing' for:
    - a. Pre-installation conference held jointly with Section 06 1636.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. National Institute of Standards and Technology (NIST), U. S. Department of Commerce:
    - a. Voluntary Product Standard DOC PS 1-09. 'Structural Plywood'.
    - b. Voluntary Product Standard DOC PS 2-04. 'Performance Standard for Wood-Based Structural-Use Panels'.
  - 2. The Engineered Wood Association (APA), Tacoma, WA [www.apawood.org](http://www.apawood.org).
    - a. Performance Rated Panels, 'Product Guide' (for products bearing the APA trademark) December 2011.
    - b. Voluntary Product Standard:
      - 1) PS 1-09. 'Structural Plywood'.
      - 2) PS 2-04. 'Performance Standard for Wood-Based Structural-Use Panels'.
    - c. PRP-108 'Performance Standards and Policies for Structural-Use Panels'.
  - 3. TECO, Cottage Grove, WI [www.tecotested.com](http://www.tecotested.com).
    - a. TECO PRP-133: ('Fire Rated Assemblies – OSB substitution for plywood in UL fire-rated assemblies that specify plywood).
- B. Reference Standards:

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conference:
  - 1. Participate in pre-installation conference as specified in Section 06 1100.
  - 2. In addition to agenda items specified in Section 01 3100 and Section 06 1100, review following:
    - a. Review Section 01 4523 for Testing and Inspection administrative requirements and responsibilities and Field Quality Control inspection required of this section.
- B. Scheduling:
  - 1. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing sheathing.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery And Acceptance Requirements:
  - 1. Do not deliver material unduly long before it is required.
  - 2. Protect sheathing and keep under cover in transit and at job site.



- B. Storage And Handling Requirements:
  1. Store sheathing on level racks and keep free of ground.
  2. Stack to insure proper ventilation and drainage.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Performance:
  1. Design Criteria:
    - a. Meet requirements of PS 1, PS 2, or PRP-133 (TECO). Except where plywood is specifically indicated on Contract Drawings, oriented strand board (OSB) is acceptable.
- B. Sheathing:
  1. Sheathing:
    - a. Sheathing shall bear grade stamp from American Plywood Association (APA) or equal grading organization.
    - b. Sheathing shall not exceed 18 percent moisture content when fabricated or more than 19 percent when installed in Project.
    - c. Sheathing **23/32 inch (18.3 mm)** thick and thicker used for single-layer subflooring shall be tongue and groove.
    - d. Sheathing used for same purpose shall be of same thickness. In all cases, thickness specified is minimum required regardless of span rating.
    - e. Minimum span ratings for given thicknesses shall be as follows:

Thickness	Span Rating
<b>3/8 inch</b>	24 / 0
<b>7/16 inch nominal</b>	24 / 16
<b>15/32 inch actual</b>	32 / 16
<b>1/2 inch nominal</b>	32 / 16
<b>19/32 inch actual</b>	40 / 20
<b>5/8 inch nominal</b>	40 / 20
<b>23/32 inch actual</b>	48 / 24
<b>3/4 inch nominal</b>	48 / 24

**2.2 ACCESSORIES**

- A. Nails:
  1. As indicated on Contract Drawings.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. General:
  1. Top of nail heads shall be flush with sheathing surface.
  2. Use of edge clips to provide spacing between sheathing panels is acceptable.
- B. Wall Sheathing:
  1. Spacing:
    - a. Provide **1/8 inch (3 mm)** space between sheets at end and edge joints.
  2. Edge Bearing And Blocking:
    - a. Panel edges shall bear on framing members and butt along their center lines.

- b. Back block panel edges, which do not bear on framing members, with **2 inch nominal (45 mm)** framing.
  3. Nail Spacing:
    - a. As indicated on Contract Drawings.
    - b. Place nails not less than **3/8 inch (9.5 mm)** in from edge.
  4. Thickness:
    - a. As indicated on Contract Drawings.
  5. Do not install any piece of wall sheathing with shortest dimension of less than **12 inches (300 mm)**.
- C. Floor Sheathing:
  1. Floor Sheathing: 1 Layer Subflooring (floors accessible to public).
    - a. Apply bead of glue to structural supports. Lay face grain / strength axis across supports and with panel continuous over two supports minimum.
    - b. Allow expansion gap of at least **1/2 inch (12.5 mm)** at walls.
    - c. Tongue and Groove.
    - d. Nail Spacing.
      - 1) As indicated on Contract Drawings.
    - e. Thickness:
      - 1) As indicated on Contract Drawings.
    - f. Do not install any piece of bottom layer floor sheathing with shortest dimension of less than **24 inches (600 mm)**.
  2. Subflooring: 2 Layers Subflooring.
    - a. Bottom layer:
      - 1) Glue subflooring layers together along lines of structural supports.
      - 2) Leave **1/32 inch (1 mm)** gap at side and end joints.
      - 3) Nail as per floor sheathing nailing requirements.
      - 4) Thickness:
        - a) **19/32 inch actual (15 mm)** minimum thickness, except where specifically noted otherwise.
      - 5) Do not install any piece of single layer floor sheathing with shortest dimension of less than **24 inches (600 mm)**.
    - b. Top layer:
      - 1) Stagger joints of second layer subflooring so they do not line up with joints of first layer subflooring, but do align with intermediate structural member (for example, align with field nailing of bottom subflooring layer).
      - 2) Glue subflooring layers together along lines of structural supports.
      - 3) Leave **1/32 inch (1 mm)** gap at side and end joints.
      - 4) Nail at **6 inch (150 mm)** centers on ends and **12 inch (300 mm)** centers on intermediate structural members.
      - 5) Thickness:
        - a) **19/32 inch actual (15 mm)** minimum thickness, except where specifically noted otherwise.
      - 6) Do not install any piece of single layer floor sheathing with shortest dimension of less than **24 inches (600 mm)**.

### 3.2 PROTECTION

- A. Protect roof sheathing from moisture until roofing is installed.

**END OF SECTION**

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**SECTION 06 1712****STRUCTURAL COMPOSITE LUMBER: SCL****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
  - 1. Laminated Veneer Lumber (LVL).
  - 2. Parallel Strand Lumber (PSL).
  - 3. Laminated Strand Lumber (LSL).
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for installation, securing, bracing, etc.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM D2559-12a(2018), 'Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior Exposure Conditions'.
    - b. ASTM D5456-18, 'Standard Specification for Evaluation of Structural Composite Lumber Products'.

**1.3 SUBMITTALS**

- A. Informational Submittals:
  - 1. Certificates: Provide certification confirming that material structural design properties and design stresses have met or exceed requirements shown on Drawings.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Storage And Handling Requirements:
  - 1. Store members on job site in accordance with Manufacturer's instructions.
  - 2. Keep dry and provide supports to keep members off floor or ground.
  - 3. Split plastic wrappers of members stored encased in plastic on bottom side to allow for air circulation.

**PART 2 - PRODUCTS****2.1 MANUFACTURED UNITS**

- A. Acceptable Manufacturers:
  - 1. Boise Cascade Corp, Boise, ID [www.bc.com](http://www.bc.com).
  - 2. Georgia-Pacific Corp, Atlanta, GA [www.gp.com](http://www.gp.com).
  - 3. Jager Industries Inc, Calgary, AB [www.jagerbuildingsystems.com](http://www.jagerbuildingsystems.com).
  - 4. Louisiana Pacific Corp, Portland, OR [www.lpcorp.com](http://www.lpcorp.com).
  - 5. Roseburg Forest Products, Roseburg, OR [www.roseburg.com](http://www.roseburg.com).
  - 6. Trus Joist Corp, Div Weyerhaeuser, Boise, ID [www.tjm.com](http://www.tjm.com) or Surrey, BC (604) 588-7878.
  - 7. Web Joist, Chehalis, WA [www.webjoist.com](http://www.webjoist.com).

8. Weyerhaeuser, Engineered Lumber Products, Boise, ID [www.woodbywy.com](http://www.woodbywy.com).
  9. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Design Criteria:
1. Materials shall be tested and evaluated in accordance with ASTM D5456.
  2. Materials shall have current ICC-ES Evaluation Report, report approved by International Codes Council, or report issued by Architect approved model code evaluation service and shall comply with requirements of report.
- C. Materials:
1. Members:
    - a. Identify materials by stamp or stamps indicating manufacturer's name, product trade name, grade, species (if applicable), evaluation report number, plant number, and name or logo of independent inspection agency.
  2. Adhesive: Meet requirements of ASTM D2559.
- D. Fabrication: Materials shall be manufactured in a plant evaluated for fabrication by governing code evaluation service and under supervision of third party inspection agency listed by governing code evaluation service.

**PART 3 - EXECUTION: Not Used**

**END OF SECTION**

**SECTION 06 2001****COMMON FINISH CARPENTRY REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install sealants required for items installed under this Section, as described in Contract Documents.
  
- B. Products Installed But Not Furnished Under This Section:
  - 1. Architectural Woodwork.
  - 2. Casings, stops, handrails, and jambs.
  - 3. Chair Rails.
  - 4. Hardwood Base.
  - 5. Hardwood Trim at light coves, speaker cabinets, etc.
  - 6. Hardwood Trim for wall covering.
  - 7. Miscellaneous Wood Trim.
  - 8. Selected Building Specialties.
  - 9. Selected Equipment.
  - 10. Wood Trim at ceilings.
  - 11. Miscellaneous as specified elsewhere.
  
- C. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for furring and blocking.
  - 2. Section 06 2210: 'Miscellaneous Wood Trim'.
    - a. Wood Trim.
  - 3. Sections under 06 4000 Heading: Furnishing of Architectural Woodwork.
    - a. Section 06 4001: 'Common Architectural Woodwork Requirements':
      - 1) Approved Fabricators.
      - 2) Quality of wood materials to be used in Finish Carpentry.
    - b. Section 06 4512: 'Architectural Woodwork Wood Trim'.
  - 4. Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealants, submittal and installation requirements.
  - 5. Sections under 09 9000 heading: Back priming of work to be installed against concrete or masonry or subjected to moisture, and finishing of finish carpentry and architectural woodwork.
  - 6. Sections in Division 10: Furnishing of Specialties.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA [www.awinet.org](http://www.awinet.org).
    - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.
  
- B. Definitions:
  - 1. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade:
    - a. Economy Grade: The lowest acceptable grade in both material and workmanship requirements, and is for work where price outweighs quality considerations.
    - b. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.

- c. Premium Grade: The highest Grade available in both material and workmanship where the highest level of quality, materials, workmanship, and installation is required.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

#### **A. Manufacturers:**

1. Manufacturer Contact List:
  - a. Blum Inc, Stanley, NC [www.blum.com](http://www.blum.com).
  - b. Bommer Industries, Landrum, SC [www.bommer.com](http://www.bommer.com).
  - c. CompX National, Mauldin, SC [www.nclnet.com](http://www.nclnet.com).
  - d. Dow Chemical, Midland, MI [www.dow.com](http://www.dow.com).
  - e. Flynn & Enslow, San Francisco, CA [www.flynnenslow.com](http://www.flynnenslow.com).
  - f. Grass America Inc, Kernersville, NC [www.grassusa.com](http://www.grassusa.com).
  - g. Hafele America Co., Archdale, NC [hafele.com](http://hafele.com).
  - h. Hillside Wire Cloth Co., Inc., Bloomfield, NJ [www.hillsidewirecloth.com](http://www.hillsidewirecloth.com).
  - i. Ives, Indianapolis, IN [www.iveshardware.com](http://www.iveshardware.com).
  - j. Knappe & Vogt, Grand Rapids, MI [www.knappeandvogt.com](http://www.knappeandvogt.com) or Knappe & Vogt Canada, Mississauga, ON (905) 676-8972.
  - k. Olympus Lock Co, Seattle, WA [www.olympus-lock.com](http://www.olympus-lock.com).
  - l. Owens Corning, Toledo, OH [www.owens-corning.com](http://www.owens-corning.com).
  - m. Salice America Inc, Charlotte, NC [www.saliceamerica.com](http://www.saliceamerica.com).
  - n. SOSS Door Hardware (Division of Universal Industrial Products Company) Pioneer OH [www.soss.com](http://www.soss.com).
  - o. Stanley, New Britain, CT [www.stanleyhardware.com](http://www.stanleyhardware.com) or Oakville, ON (800) 441-1759.
  - p. TWP Inc., Berkley, CA [www.twpinc.com](http://www.twpinc.com).
  - q. Wire Cloth Manufacturers Inc., Mine Hill, NJ [www.wireclothman.com](http://www.wireclothman.com).

- B. Glue: Waterproof and of best quality.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

#### **A. Verification Of Conditions:**

1. Verify walls, ceilings, floors, and openings are plumb, straight, in-line, and square before installing Architectural Woodwork.
2. Report conditions that are not in compliance to Architect before starting installation.

### **3.2 PREPARATION**

#### **A. Surface Preparation:**

1. Install Architectural Woodwork after wall and ceiling painting is completed in areas where Architectural Woodwork is to be installed.

- B. Items Installed But Not Furnished Under This Section: Install in accordance with requirements specified in Section furnishing item.

### **3.3 INSTALLATION**

#### **A. Special Techniques:**

1. AWS Custom Grade is minimum acceptable standard, except where explicitly specified otherwise, for installation of architectural woodwork.
- B. General Architectural Woodwork Installation:
1. Fabricate work in accordance with measurements taken on Project site.
  2. Scribe, miter, and join accurately and neatly to conform to details.
  3. Exposed surfaces shall be machine sanded, ready for finishing.
  4. Allow for free movement of panels.
  5. Countersink nails. Countersink screws and plug those exposed to view.
  6. Attach custom casework as specified in Sections under 06 4000 Heading: 'Furnishing of Architectural Woodwork' to wall blocking with #10 x 3 inch (76 mm) minimum Cabinet Screws. Attach wall cabinets with screws equally spaced horizontally not to exceed 12 inches (305 mm) O.C. with 3 inch (76 mm) maximum spacing at cabinet edges.

**END OF SECTION**



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**SECTION 06 2024****DOOR, FRAME, AND FINISH HARDWARE INSTALLATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install sealants for caulking door frames as described in Contract Documents.
  - 2. Furnish and install insulation in doorframes as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Flush wood doors.
  - 2. Hollow metal door frames.
  - 3. Finish hardware.
- C. Related Requirements:
  - 1. Sections under 04 2000 heading: Grouting of frames installed in masonry walls.
  - 2. Section 08 1416: 'Flush Wood Doors'.
  - 3. Section 07 2116: 'Blanket Insulation' for quality of fiberglass insulation.
  - 4. Section 07 9213: 'Elastomeric Joint Sealants' for quality of sealants.
  - 5. Sections under 08 1000 heading: Furnishing of doors and metal frames.
  - 6. Sections under 08 7000 heading: Furnishing of finish hardware.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conference.
  - 1. Participate in pre-installation conference.
  - 2. In addition to agenda items specified in Section 01 3100, review following:
    - a. Schedule conference after hardware has been delivered to site and organized into hardware groups by door, but before installation of hardware.
    - b. Check for appropriate blocking and for correct hardware models and fasteners for substrates.
    - c. Review submittals and set of Manufacturer's installation, adjustment, and maintenance instructions submitted under Section 08 7101.
    - d. Review use of crowbar or other prying devices are not permitted to be used to set door frame into wall opening.

**1.3 SUBMITTALS**

- A. Informational Submittals:
  - 1. Installer Report:
    - a. Report verifying correct operation and adjustment of installed hardware.
  - 2. Special Procedure Submittals:
    - a. Copy of 'Installation Guide for Doors & Hardware' by Door & Hardware Institute. Guide may be obtained from Door and Hardware Institute (DHI).

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery And Acceptance Requirements:
  - 1. Wood Doors:

- a. Do not have doors delivered to building site until after plaster, cement, and taping compound are dry.
  - b. If doors are to be stored at job-site for more than one week, seal top and bottom edges if not factory sealed.
  2. Metal Frames:
    - a. Examine door frames and note damage upon acceptance.
- B. Storage And Handling Requirements:
1. Wood Doors:
    - a. Store flat on a level surface in a dry, well ventilated building.
      - 1) Cover to keep clean but allow air circulation
    - b. Handle with clean gloves and do not drag doors across one another or across other surfaces.
    - c. Do not subject doors to abnormal heat, dryness, or humidity or sudden changes therein
      - 1) Condition doors to average prevailing humidity of locality before hanging.
  2. Metal Frames:
    - a. Protect metal frames from damage before and during installation.

## PART 2 - PRODUCTS: Not Used

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Hollow Metal Frames:
1. Site Tolerances:
    - a. Squareness: **1/16 inch (1.6 mm)** from top edge to opposite top edge.
    - b. Plumbness: **1/16 inch (1.6 mm)** from top of jamb to bottom of jamb.
    - c. Alignment: **1/16 inch (1.6 mm)** from plane of left side face of jamb to right side face of jamb.
    - d. Twist: **1/16 inch (1.6 mm)** across throat of jamb plane measured across each face to plane of opposite jamb throat.
    - e. Finished Clearance Between Door And Frame:
      - 1) **1/16 inch (1.6 mm)** at head and hinge jamb plus **1/16 inch (1.6 mm)** maximum
      - 2) **1/8 inch (3 mm)** at strike jamb plus or minus **1/16 inch (1.6 mm)** maximum.
      - 3) **1/2 inch (12.7 mm)** to top of finished floor surface or **1/4 inch (6 mm)** to top of threshold, plus or minus **1/16 inch (1.6 mm)** maximum.
  2. Set frame in location and level head.
    - a. Use of crowbar or other prying device to set door frame into wall opening will damage door frames and are not permitted to be used.
  3. Equalize with adjustable floor anchor.
  4. Set spreaders and fasten jambs to floor and wall.
    - a. Wood spreaders shall be square, fabricated from lumber one inch minimum thick, be same length as door opening at header, and same depth as frame.
    - b. Cut notches for frame stops.
    - c. Do not remove spreaders until frames are permanently anchored in wall.
    - d. Use one spreader at base of frame and another at strike level.
    - e. Do not use temporary spreaders welded to base of jambs during installation of frame.
  5. Fill gap between frame and framing with urethane foam or tightly-packed fiberglass insulation. If urethane foam is used, foam interior of frames before installing frame. Trim excess before installation of frame.
  6. Caulking:
    - a. Caulk around both sides of frames of doors receiving acoustical seals with specified sealant.
- B. Doors:
1. When Project is completed, doors shall not bind, stick, or be mounted so as to cause future hardware difficulties.

2. Do not impair utility or structural strength of door in fitting of door, applying hardware, or cutting and altering door louvers, panels, or other special details.
- C. Hardware:
1. General:
    - a. Install using set of Manufacturer's installation, adjustment, and maintenance instructions submitted with hardware under Section 08 7101. Follow as closely as possible.
    - b. Mount closers on jamb stop side of door in parallel arm configuration where it is physically possible to do so and not damage or hinder operation of door or closer.
  2. Hardware for Wood Doors:
    - a. If doors are not factory-machined, use hardware templates furnished by Hardware Manufacturer when mounting hardware.
    - b. Set hinges flush with edge surface. Be sure that hinges are set in a straight line to prevent distortion.
    - c. Mount door latches high in strike plate opening so when door later settles, latch will not bind.

### 3.2 FIELD QUALITY CONTROL

- A. Field Tests:
1. Arrange to have keys brought to Project site and, in meeting attended by local representatives and Architect, test every new key and locking mechanism.
- B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
1. Correct any work found defective or not complying with contract document requirements at no additional cost to the Owner.
  2. Door frames:
    - a. Door frames damaged by use of crowbar or other prying devices to set door frames shall be repaired or replaced at no additional cost to Owner.

### 3.3 CLOSEOUT ACTIVITIES

- A. Instruction of Owner:
1. Using Owner's Operations And Maintenance Manual, explain keying systems at same time keys and locking mechanisms are tested.
- B. Key Delivery:
1. Immediately before Final Acceptance Meeting, turn change keys over to Owner properly organized, tagged, and placed in existing key cabinet.

**END OF SECTION**

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**SECTION 06 2210****MISCELLANEOUS WOOD TRIM****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install wood trim not specified elsewhere as described in Contract Documents.
  2. Section 06 4512: 'Architectural Woodwork Wood Trim'.
  3. Section 09 9324: 'Interior Clear-Finished Hardwood'.

**1.2 REFERENCES**

- A. Association Publications:
1. Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA [www.awinet.org](http://www.awinet.org).
    - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.
- B. Definitions:
1. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade:
    - a. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.
  2. Plain-Sawn: A hardwood figure developed by sawing a log lengthwise at a tangent to the annual growth rings. It appears as U-shaped or straight markings in the board's face.

**1.3 SUBMITTALS**

- A. Action Submittals:
1. Samples:
    - a. Interior Hardwood for Transparent Finish:
      - 1) Before performing work of this Section, prepare Control Sample, to match sample available from Owner, to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
      - 2) Design Criteria:
        - a) Provide **8 inch by 10 inch (200 mm by 255 mm)** sample of Birch to match Owner provided stain color selected for Project.
        - b) Control Sample will be used as performance standard for evaluating finish provided.
- B. Informational Submittals:
1. Source Quality Control Submittals:
    - a. Samples:
      - 1) Interior Hardwood for Transparent Finish:
        - a) Owner will provide Control Sample for finish.

**1.4 WARRANTY**

- A. Manufacturer Extended Warranty:

1. Approved Fabricator's written guarantee that all Goods and Services will be free from defects in materials and workmanship for a period of five (5) years from date of substantial completion.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Design Criteria:
  1. General:
    - a. Meet requirements of Section 06 4001 for general standards for materials and fabrication of Architectural Woodwork.
  2. Clear Finished Hardwood:
    - a. Match materials specified in Section 06 4512.
    - b. Match finish specified in Section 06 4512 and match Owner selected sample as specified in Section 09 9324.
  3. Clear Finished Paneling: Match materials specified in Sections 06 4216.
  4. Opaque Finished Hardwood: Hardwood allowed by AWS Custom Grade.
  5. Opaque Finished Softwood: Solid stock Pine, C or better, S4S.
  6. Opaque Finished Paneling: Paneling allowed by AWS Custom Grade.

### **2.2 SOURCE QUALITY CONTROL**

- A. Inspections:
  1. Clear Finished Hardwood:
    - a. Color matches Owner provided sample specified in Section 09 9324.

## **PART 3 - EXECUTION: Not Used**

**END OF SECTION**

**SECTION 06 4001****COMMON ARCHITECTURAL WOODWORK REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. General standards for materials and fabrication of Architectural Woodwork and for hardware associated with Architectural Woodwork.
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for furring and blocking.
  - 2. Section 06 2001: 'Common Finish Carpentry Requirements' for Installation.
  - 3. Section 06 2210: 'Miscellaneous Wood Trim'.
  - 4. Section 06 4512: 'Architectural Woodwork Wood Trim'.
  - 5. Section 09 9324: 'Interior Clear-Finished Hardwood' for filling of nail holes and finishing.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA [www.awinet.org](http://www.awinet.org).
    - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.
- B. Definitions:
  - 1. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade:
    - a. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.

**1.3 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature for specialty items and hardware not manufactured by Architectural Woodwork fabricator.
  - 2. Shop Drawings:
    - a. Fabricator:
      - 1) Provide shop drawings for cabinet and casework that are included for project showing details, casework locations and layout in compliance with Contract Drawings.
- B. Informational Submittals:
  - 1. Qualification Statement:
    - a. Fabricator:
      - 1) Provide Qualification documentations as requested.

**1.4 QUALITY ASSURANCE**

- A. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
  - 1. Fabricator:



- a. Fabricator Firm specializing in performing work of this section.
  - 1) Firm experience in supplying products indicated for this Project.
  - 2) Firm with sufficient production capacity to produce required units.
  - 3) Firm will comply with specifications and Contract Documents for this Project.
  - 4) Minimum five (5) years experience in Woodwork installations.
  - 5) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and installation procedures required for this project before bidding.
- b. Upon request by Architect or Owner, submit documentation.

## 1.5 DELIVERY, HANDLING, AND STORAGE

- A. Delivery And Acceptance Requirements:
  1. Assemble architectural woodwork at Architectural Woodwork Fabricator's plant and deliver ready for erection insofar as possible.
  2. Protect architectural woodwork from moisture and damage while in transit to job site.
  3. Report damaged materials received within two (2) days from delivery at project site.
- B. Storage And Handling Requirements:
  1. Unload and store in place where it will be protected from moisture and damage and convenient to use.

## PART 2 - PRODUCTS

### 2.1 FABRICATORS

- A. Approved Fabricators. See Section 01 4301:
  1. Meet Quality Assurance Fabricator Qualifications as specified in Part 1 of this specification.

### 2.2 ASSEMBLIES

- A. Design Criteria:
  1. General:
    - a. AWS Custom Grade is minimum acceptable standard, except where explicitly specified otherwise, for materials, construction, and installation of architectural woodwork.
  2. Materials:
    - a. Lumber:
      - 1) Grade:
        - a) No defects in boards smaller than 600 sq in (3 871 sq cm).
        - b) One defect per additional 150 sq inches (968 sq cm) in larger boards.
        - c) Select pieces for uniformity of grain and color on exposed faces and edges.
        - d) No mineral grains accepted.
      - 2) Allowable Defects:
        - a) Tight knots not exceeding 1/8 inch (3 mm) in diameter. No loose knots permitted.
        - b) Patches (dutchmen) not apparent after finishing when viewed beyond 18 inches (450 mm).
        - c) Checks or splits not exceeding 1/32 inch by 3 inches (1 mm by 75 mm) and not visible after finishing when viewed beyond 18 inches (450 mm).
        - d) Stains, pitch pockets, streaks, worm holes, and other defects not mentioned are not permitted.
        - e) Normal grain variations, such as cats eye, bird's eye, burl, curl, and cross grain are not considered defects.
      - 3) Use maximum lengths possible, but not required to exceed 10 feet (3 meters) without joints. No joints shall occur closer than 72 inches (1 800 mm) in straight runs exceeding 18 feet (3 600 mm). Runs between 18 feet (3 600 mm) and 10 feet (3

- meters) may have no more than one joint. No joints shall occur within 72 inches (1 800 mm) of outside corners nor within 18 inches (450 mm) of inside corners.
- 4) Moisture content shall be six (6) percent maximum at fabrication. No opening of joints due to shrinkage is acceptable.

B. Fabrication:

1. Follow Architectural Woodwork Standards (AWS) for fabrication of Architectural Woodwork.
2. Tolerances:
  - a. No planer marks (KCPI) allowed. Sand wood members and surfaces with 100 grit or finer.
  - b. Maximum Gap: None allowed.
  - c. Flushness Variation: 0.015 inch (0.4 mm) maximum.
  - d. Sanding Cross Scratches: 1/4 inch (6 mm) maximum.
  - e. Plug screw holes. Screw locations not to be visible beyond 18 inches (450 mm).
3. Fabricate work in accordance with measurements taken on job site.
4. 'Ease' sharp corners and edges of exposed members to promote finishing and protect users from splinters. Radius of 'easing' shall be uniform throughout Project and between 1/32 and 1/16 of an inch (0.8 and 1.6 of a millimeter).
5. Fabricate so veneer grain is vertical.
6. Joints:
  - a. Use lumber pieces with similar grain pattern when joining end to end.
  - b. Compatibility of grain and color from lumber to panel products is required.
7. Install hardware in accordance with Manufacturer's directions. Leave operating hardware operating smoothly and quietly.
8. Remove or repair damaged surface of or defects in exposed finished surfaces of architectural woodwork to match adjacent similar undamaged surface.

**PART 3 - EXECUTION: Not Used**

**END OF SECTION**

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**SECTION 06 4512****ARCHITECTURAL WOODWORK WOOD TRIM****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
  - 1. Casings, stops, handrails, and jambs.
  - 2. Chair rails.
  - 3. Hardwood trim at light coves, speaker cabinets, etc,
  - 4. Hardwood base.
  - 5. Hardwood trim for wall covering.
  - 6. Wood trim at ceiling trim.
  
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for wall blocking required for Wood Trim.
  - 2. Section 06 2001: 'Common Finish Carpentry Requirements':
    - a. Installation of Wood Trim.
  - 3. Section 06 2210: Remaining Wood Trim.
  - 4. Section 06 4001: 'Common Architectural Woodwork Requirements':
    - a. Approved Fabricators.
    - b. General standards for materials and fabrication of Architectural Woodwork.
  - 5. Section 08 1429: Interior Flush Wood Doors.
  - 6. Section 09 9324: 'Interior Clear-Finished Hardwood'.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada / Woodwork Institute, 46179 Westlake Drive, Suite 120, Potomac Falls, VA [www.awinet.org](http://www.awinet.org).
    - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.
  
- B. Definitions:
  - 1. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade.
    - a. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.
  - 2. Plain-Sawn: A hardwood figure developed by sawing a log lengthwise at a tangent to the annual growth rings. It appears as U-shaped or straight markings in the board's face.
  - 3. Running Trim: Generally combined in the term "standing and running trim" and refers to random, longer length trims delivered to the jobsite (e.g., baseboard, chair rail, crown molding).

**1.3 SUBMITTALS**

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Include materials used, standing and running trim profiles, joint details, and hardware.
  - 2. Samples:
    - a. Interior Hardwood for Transparent Finish:

- 1) Before performing work of this Section, prepare Control Sample, to match sample available from Owner, to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
  - 2) Design Criteria:
    - a) Provide 8 inch by 10 inch (200 mm by 255 mm) sample of Birch to match Owner provided stain color selected for Project.
    - b) Control Sample will be used as performance standard for evaluating finish provided.
- B. Informational Submittals:
1. Source Quality Control Submittals:
    - a. Samples:
      - 1) Interior Hardwood for Transparent Finish:
        - a) Owner will provide Control Sample for finish.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Manufacturers:
1. Approved Fabricators. See Section 06 4001 for Approved Fabricators.
- B. Performance / Design Criteria: Conform to requirements of Section 06 4001 'Common Architectural Woodwork Requirements'.
1. Glue: Waterproof and of best quality.
  2. Factory-finish to match Owner selected sample as specified in Section 09 9324.
- C. Architectural Woodwork Wood Trim:
1. Interior Hardwood For Transparent Finish:
    - a. Design Criteria:
      - 1) Solid wood shall be Birch wood to match existing in building.
      - 2) Paneling shall be panel product with Birch wood veneer.
      - 3) Finish to match Owner selected sample as specified in Section 09 9324.
    - b. Match existing Project Color Scheme:
      - 1) Control Sample provided by Owner:
        - a) Control Sample will be existing wood item from Project.
  2. Interior Wood For Opaque, Painted Finish:
    - a. Applies to ceiling trim only.
    - b. Solid wood shall be any species allowed by AWS Custom grade.

### **2.2 SOURCE QUALITY CONTROL**

- A. Inspections:
1. Clear Finished Hardwood:
    - a. Color matches Owner provided sample specified in Section 09 9324.

## **PART 3 - EXECUTION Not Used**

**END OF SECTION**

## **DIVISION 07: THERMAL AND MOISTURE PROTECTION**

### **07 2000 THERMAL PROTECTION**

07 2116 BLANKET INSULATION  
07 2123 LOOSE-FILL INSULATION

### **07 5000 MEMBRANE ROOFING**

07 5202 MODIFIED BITUMINOUS MEMBRANE ROOFING

### **07 6000 FLASHING AND SHEET METAL**

07 6210 GALVANIZED STEEL FLASHING AND TRIM

### **07 9000 JOINT PROTECTION**

07 9213 ELASTOMERIC JOINT SEALANTS

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**SECTION 07 2116****BLANKET INSULATION****PART 1 - GENERAL****1.1 SUMMARY**

## A. Includes But Not Limited To:

1. Furnish and install faced thermal and acoustic batt insulation as described in Contract Documents.
2. Furnish and install unfaced thermal insulation in ceilings as described in Contract Documents.

## B. Related Requirements:

1. Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for furnishing and installing of insulation in hollow metal door frames.

**1.2 REFERENCES**

## A. Reference Standards:

1. ASTM International:
  - a. ASTM C665-17, 'Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing'.

**1.3 QUALITY ASSURANCE**

## A. Regulatory Agency Sustainability Approvals:

1. Insulation shall be manufactured and installed in compliance with International Building Code (IBC) or other applicable building codes.

**PART 2 - PRODUCTS****2.1 SYSTEMS**

## A. Manufacturers:

## 1. Insulation:

## a. Type One Acceptable Manufacturers:

- 1) Certaineed Corp, Valley Forge, PA [www.certainteed.com](http://www.certainteed.com).
- 2) FiberTEK, Salt Lake City, UT [www.fibertekinsulation.com](http://www.fibertekinsulation.com).
- 3) Guardian Fiberglass, Greer, SC [www.guardianbp.com](http://www.guardianbp.com).
- 4) Johns Manville, Denver, CO [www.jm.com](http://www.jm.com).
- 5) Knauf Fiber Glass, Shelbyville, IN [www.knaufusa.com](http://www.knaufusa.com).
- 6) Owens-Corning Fiberglass Corporation, Toledo, OH [www.owens-corning.com](http://www.owens-corning.com).
- 7) Thermafiber, Wabash, IL [www.thermafiber.com](http://www.thermafiber.com).

## b. Equal as approved by Architect before bidding. See Section 01 6200.

## B. Materials:

## 1. Thermal And Acoustic Insulation:

- a. Order insulation by 'R' value rather than 'U' value, rating, or thickness, either 16 or 24 inches (400 or 600 mm) wide according to framing spacing.
- b. Faced Insulation:
  - 1) Kraft faced meeting requirements of ASTM C665, Type II, Class C.



- c. Unfaced Insulation: Meet requirements of ASTM C665, Type I.
  - 1) Support at trussed rafters:
    - a) Provide support at trussed rafters where insulation is not enclosed by structure or drywall.
- d. 'R' Value Required:
  - 1) Acoustically Insulated Ceilings:
    - a) Enclosed Spaces: Fill framed cavity with batt of appropriate thickness.
    - b) Unenclosed Spaces: R-19.
    - c) Unenclosed Spaces above Offices and Restrooms: R-30.
  - 2) Thermally Insulated Ceilings / Roof:
    - a) R-38C Cathedral / High Density: At 2x12 (50x300 mm) Overbuild Framing.
    - b) R-38 Standard: All Other. (R-49 in Climate Zones 6, 7, and 8).
  - 3) Wood Wall Stud Framing:

R-11	3-1/2 inches deep	89 mm deep
R-19	5-1/2 inches deep	140 mm deep

## 2.2 ACCESSORIES SYSTEMS

- A. Attic Baffles:
  - 1. Design Criteria:
    - a. Baffle can be used with spray foam, loose-fill, fiberglass, or other insulation materials.
  - 2. Type One Acceptable Manufacturers:
    - a. SB24 SmartBaffle by DCI Products, Inc., Clifton Heights, PA [www.dciproducts.com](http://www.dciproducts.com).
    - b. Equal as approved by Architect before bidding. See Section 01 6200.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General:
  - 1. Leave no gaps in insulation envelope.
  - 2. If two layers of insulation are used to attain required 'R' value, only layer towards interior of building shall have facing.
  - 3. Provide minimum clearance around recessed lighting fixtures as approved by local code.
- B. In Framing:
  - 1. Install insulation behind plumbing and wiring, around duct and vent line penetrations, and in similar places.
  - 2. Fit ends of batts snug against top and bottom plates.
  - 3. Fit batts snug against stud framing at each side.
  - 4. Where insulation is not enclosed by structure or drywall, support in place with wire or other suitable material as approved by Architect before bid.
- C. Attic Baffles:
  - 1. Install baffles between trusses and rafters at ventilation spaces to prevent insulation from blocking airflow from soffit.
  - 2. Install baffles to prevent insulation from blocking ventilation airflow from soffit.

**END OF SECTION**

**SECTION 07 2123****LOOSE-FILL INSULATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install loose-fill insulation as described in Contract Documents.

**1.2 REFERENCES**

- A. Definitions:
1. Flame Spread: The propagation of flame over a surface.
  2. Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84.
  3. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84.
- B. Reference Standards:
1. ASTM International:
    - a. ASTM C518-17, 'Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus'.
    - b. ASTM C764-17, 'Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation'.
    - c. ASTM E84-18b, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
    - d. ASTM E136-19, 'Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C'.

**1.3 SUBMITTALS**

- A. Action Submittals:
1. Product Data:
    - a. Manufacturer's literature describing products to be used, showing compliance with specified requirements.
    - b. Manufacturer's storage and handling requirements and recommendations.
    - c. Manufacturer's installation instructions.

**1.4 QUALITY ASSURANCE**

- A. Regulatory Agency Sustainability Approvals:
1. Insulation shall be manufactured to be in compliance with International Code Council (IBC) or other applicable building codes.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery And Acceptance Requirements:
1. Materials shall be delivered in original, unopened packages with labels intact.
    - a. Labels to identify reference standards, type and class as applicable, minimum net weight of insulation, coverage, "R" values, and required warning statements.

**B. Storage And Handling Requirements:**

1. Protect from physical damage and from becoming wet, soiled, or covered with ice or snow.
2. Provide dry location with adequate ventilation for storage, not subject to open flames or sparks, and permitting easy access for inspection and handling.
3. Store materials in dry locations with adequate ventilation, free from water, and in such a manner to permit easy access for inspection and handling
4. Comply with Manufacturer's recommendations for handling, storage, and personal protection during installation.

**PART 2 - PRODUCTS****2.1 SYSTEMS****A. Manufacturers:****1. Insulation:****a. Type One Acceptable Manufacturers:**

- 1) Certaineed Corp, Valley Forge, PA [www.certainteed.com](http://www.certainteed.com).
- 2) FiberTEK, Salt Lake City, UT [www.fibertekinsulation.com](http://www.fibertekinsulation.com).
- 3) Guardian Fiberglass, Greer, SC [www.guardianbp.com](http://www.guardianbp.com).
- 4) Johns Manville, Denver, CO [www.jm.com](http://www.jm.com).
- 5) Knauf Fiber Glass, Shelbyville, IN [www.knaufusa.com](http://www.knaufusa.com).
- 6) Owens-Corning Fiberglass Corporation, Toledo, OH [www.owens-corning.com](http://www.owens-corning.com).

**b. Equal as approved by Architect before bidding. See Section 01 6200.****B. Materials:****1. Loose-Fill Insulation:****a. Blown Insulation:**

- 1) Fiber glass.
- 2) Comply with requirements of ASTM C764, Type I or II, non-combustible when tested in accordance with ASTM E136.

**b. 'R' Factor Required:**

- 1) Order insulation by 'R' factor rather than 'U' factor, rating, or thickness.
  - a) Unenclosed Spaces: R38 minimum.

**2.2 ACCESSORIES SYSTEMS****A. Attic Baffles:****1. Design Criteria:**

- a. Baffle can be used with spray foam, loose-fill, fiberglass, or other insulation materials.

**2. Type One Acceptable Manufacturers:**

- a. SB24 SmartBaffle by DCI Products, Inc., Clifton Heights, PA [www.dciproducts.com](http://www.dciproducts.com).
- b. Equal as approved by Architect before bidding. See Section 01 6200.

**PART 3 - EXECUTION****3.1 EXAMINATION****A. Verification Of Conditions:****1. Inspection:**

- a. Examine substrate and verify framing is suitable for installation of insulation:
- b. Verify that mechanical and electrical services have been installed and tested and, if appropriate, verify that adjacent materials are dry and ready to receive insulation.
- c. Notify Architect of unsuitable conditions in writing.
- d. Do not install insulation over unsuitable conditions:

- 1) Commencement of Work by installer is considered acceptance of substrate.

### **3.2 INSTALLATION**

#### **A. General:**

1. Install in accordance with manufacturer's instructions.
2. Install in insulation in sufficient depth to provide thermal value specified after settlement of insulation.
3. Do not blow insulation into electrical devices and vents.
4. Provide minimum clearance around recessed lighting fixtures as approved by local code.

#### **B. Attic Baffles:**

1. Install in accordance with manufacturer's instructions.
2. Install baffles between trusses and rafters at ventilation spaces to prevent insulation from blocking airflow from soffit.
3. Install baffles to prevent insulation from blocking ventilation airflow from soffit.

### **3.3 FIELD QUALITY CONTROL**

#### **A. Field Inspections:**

1. Insulation meets required thickness requirements.

#### **B. Non-Conforming Work:** Non-conforming work as covered in General Conditions applies, but is not limited to the following:

1. Correct any work found defective or not complying with contract document requirements at no additional cost to Owner.

### **3.4 PROTECTION**

#### **A. Protect installed products until project completion.**

#### **B. Repair or replace damaged products.**

### **3.5 CLEANING**

#### **A. Waste Management:**

1. Disposal of rubbish, debris, and packaging materials in approved manner.

**END OF SECTION**

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**SECTION 07 5202****MODIFIED BITUMINOUS MEMBRANE ROOFING: Steeple****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
  - 1. Furnish and install SBS Cold Application Adhesive Modified Bituminous Membrane roofing system at new mechanical penthouse curb as described in Contract Documents:
    - a. Installers Option: SBS Cold Application Adhesive or Hot Asphalt Application Adhesive (SBS application is preferred method).
  - 2. Membrane Roofing installation instructions specified in this section.
- B. Related Requirements:
  - 1. Sections under 07 3000: 'Steep Slope Roofing' for:
    - a. Installation of membrane under steeple.
    - b. Pre-installation conference held jointly with steep slope roofing material selected for Project.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM D3019/D3019M-17, 'Standard Specification for Lap Cement Used with Asphalt Roll Roofing, Non-Fibered, Asbestos-Fibered, and Non-Asbestos-Fibered'.
    - b. ASTM D4479/D4479M-07(2018), 'Standard Specification for Asphalt Roof Coatings - Asbestos-Free'.
    - c. ASTM D4586/D4586-07(2018), 'Standard Specification for Asphalt Roof Cement, Asbestos-Free'.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conference:
  - 1. Participate in MANDATORY pre-installation conference as specified in steep slope roofing material section selected for Project after installation of roof deck but before application of roofing system, review following:
    - a. Review any items affecting issuance of roofing system warranty.
    - b. Review Cold Applied adhesive requirements.
    - c. Review Steeple Contract Drawing details and sections.
    - d. Review required Roof Accessories included in installation of membrane.
    - e. Review Steeple access.
    - f. Review Cleaning and Disposal requirements.
    - g. Review Safety issues.

**1.4 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature or cut sheet for each component of system.
- B. Informational Submittals:
  - 1. Special Procedure Submittals:

- a. Contact Owner's Representative (FM Group or Project Manager) for following information:
    - 1) Installer to include following mandatory information to be added to 'Roofing Manufacturer System Warranty' submitted with Closing Documents.
      - a) Name of Owner (name of FM Group) \_\_\_\_\_
      - b) Mailing Address (FM office address) \_\_\_\_\_
      - c) Building Property ID (unique 7 digit identifier) \_\_\_\_\_
      - d) Project site address: \_\_\_\_\_
      - e) Roof Completion Date \_\_\_\_\_
      - f) Any addition data required from Manufacturer.
    - 2) Installer to include following mandatory information to be added to 'Roof Installer Workmanship Warranty' submitted with Closing Documents:
      - a) Name of Owner (name of FM Group) \_\_\_\_\_
      - b) Mailing Address (FM office address) \_\_\_\_\_
      - c) Building Property ID (unique 7 digit identifier) \_\_\_\_\_
      - d) Project site address: \_\_\_\_\_
      - e) Roof Completion Date \_\_\_\_\_
      - f) Any addition data required from Manufacturer.
  2. Qualification Statement:
    - a. Installer:
      - 1) Provide Qualification documentation if requested by Architect.
- C. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of 'Roofing Manufacturer System Warranty' and required Owner mandatory information.
      - 2) Final, executed copy of 'Roof Installer Workmanship Warranty' including required Owner mandatory information.
      - 3) Verify mandatory information as specified in Special Procedure Submittal has been included in Final Warranty.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Manufacturer's literature or cut sheet.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  1. Building Codes:
    - a. Roof system will meet requirements of all federal, state, and local codes having jurisdiction.
- B. Qualifications:
  1. Installers:
    - a. Requirements of Section 01 4301 applies but not limited to the following:
      - 1) Provide documentation if requested by Architect.
        - a) Approved and authorized by Roofing Manufacturer to install Manufacturer's product and eligible to receive Manufacturer's warranty before bid.
        - b) Minimum three (3) satisfactorily completed installations of comparable quality, scope, similar size, and complexity in past two (2) years before bidding.
          - (1) List of roofing installations performed by certified installer, and their addresses.
        - c) Current license for the city, county, and state where project is located and license for specific type of roofing work to be performed.
        - d) Roofing Installer's foreman shall be skilled in his trade and qualified to lay out and supervise the Work.
        - e) Flashing installation shall be performed by personnel trained and authorized by Roofing Manufacturer.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
1. Make no deliveries to job site until installation is about to commence, or until approved storage area is provided.
  2. Deliver products to job site in Manufacturer's original unopened containers or wrappings with labels intact and legible bearing all seals and approvals.
  3. Deliver materials in sufficient quantities to allow continuity of work.
  4. Remove any material not approved from job site.
- B. Storage And Handling Requirements:
1. Follow Manufacturer's instructions and precautions for storage and protection of materials.
  2. Handle rolled goods so as to prevent damage to edge or ends.
  3. Store rolled goods on end.
  4. Select and operate materials handling equipment so as not to damage existing construction or applied roofing.
  5. Store materials on clean, raised platforms or pallets with weather-protective covering.
  6. Provide continuous protection of materials against wetting and moisture absorption. Remove wet materials from site.

## 1.7 WARRANTY

- A. Manufacturer Warranty:
1. Membrane Manufacturer's 20 year Warranty in favor of Owner for replacement cost. (Wind warranty not required).
- B. Roof Installer Workmanship Warranty:
1. Provide five (5) year workmanship warranty on roofing system and related components for membrane under steeple, including scupper(s), and responsible for all repairs to roofing system and related components due to roof installer's own negligence or faulty workmanship.

## PART 2 - PRODUCTS

### 2.1 SYSTEM

- A. Description: SBS Cold Application Adhesive Modified Bituminous Membrane Roofing System.
- B. Manufacturers:
1. Category Four Approved System Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. CertainTeed Roofing Products Co Inc, Valley Forge, PA [www.certainteed.com](http://www.certainteed.com).
    - b. GAF Materials Corp, Wayne, NJ [www.gaf.com](http://www.gaf.com).
    - c. John Manville, Denver, CO [www.JM.com](http://www.JM.com).
    - d. Malarkey Roofing Products, Portland, OR [www.malarkey-rfg.com](http://www.malarkey-rfg.com).
- C. Performance:
1. Design Criteria:
    - a. Roofing system shall be UL Class A minimum.
- D. Materials: Match existing roofing materials.
1. Insulation / Recovery Board:
    - a. FM or UL approved.
    - b. On Deck:
      - 1) **1/2 inch (12.7 mm)** thick minimum Dens-Deck Roof Board by G-P Gypsum or SecurRock Gypsum Fiber by USG.
      - 2) **5/8 inch (15.9 mm)** thick minimum Dens-Deck Fireguard Roof Board by G-P Gypsum or SecurRock Gypsum Fiber by USG.



- c. Middle Layer:
  - 1) **1/4 in per ft (6 mm per 305 mm)** polyisocyanurate with five year aged `R' value of insulation of 4.7 per inch.
  - 2) **1/4 in per ft (6 mm per 305 mm)** tapered polyisocyanurate with five year aged `R' value of insulation of 4.7 per inch.
- d. Top Layer:
  - 1) **1/2 inch (12.7 mm)** thick minimum Dens-Deck Roof Board by G-P Gypsum or SecurRock Gypsum Fiber by USG.
- 2. Membranes:
  - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) CertainTeed:
      - a) Base Ply: Flintlastic Base 20.
      - b) Cap Sheet: Flintlastic FR Cap 30.
    - 2) GAF:
      - a) Base Ply: Ruberoid 20.
      - b) Cap Sheet: Ruberoid 30FR.
    - 3) John Manville:
      - a) Base Ply: DynaBase.
      - b) Cap Sheet: DynaGlas 30 FR.
    - 4) Malarkey:
      - a) Base Ply: Paragon Ultra Base.
      - b) Cap Sheet: Paragon 625 Ultra Cap.
- 3. Modified Bitumen Adhesive:
  - a. Premium Cold Application Modified Bitumen Adhesive conforming to ASTM D4479/D4479M and ASTM D3019/D3019M Type II:
    - 1) For adhering base ply to insulation/coverboard: **50-70 sf/gal (1.23-1.72 sm/l)**.
    - 2) For adhering top ply to base ply: **50-70 sf/gal (1.23-1.72 sm/l)**.
    - 3) Apply between **40 deg F (4.4 deg C)** and **100 deg F (37.8 deg C)**.
    - 4) When temperature is below **50 deg F (10 deg C)** adhesive must be stored in warm area **70 deg F (21.1 deg C)**.
    - 5) Adhesive can be installed with notched **1/4 inch (6.4 mm)** serrated squeegee or trowel as well as spray equipment.
- 4. Modified Bitumen Flashing Adhesive:
  - a. Premium SBS Flashing Cement/adhesive conforming to ASTM D4586/D4586 Type I:
    - 1) For adhering flashing membrane to vertical surfaces: **8 gallon (30.3 liter)** per **square foot (0.093 square meter)** at **1/8 inch (3 mm)** thick:
    - 2) Apply between **40 deg F (4.4 deg C)** and **100 deg F (37.8 deg C)**. When temperature is below **50 deg F (10 deg C)** adhesive must be stored in warm area **70 deg F (21.1 deg C)**.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Examine deck under steeple for adequacy before commencing work. Requirements shall include:
    - a. Designed slope.
    - b. Smoothness.
    - c. Moisture conditions.
    - d. Other conditions incompatible with good roofing practice.
  - 2. Notify Architect in writing of conditions that would limit warranty on part of Manufacturer or Applicator.

### 3.1 INSTALLATION

- A. Interface With Other Work:

1. Coordinate with Sections whose work requires men and equipment to traverse roof deck.

B. General:

1. Apply roofing only in dry weather.

C. Installation Over Wood Deck:

1. Follow Manufacturer's written instructions:
2. Insulation:
  - a. Mechanically attach first layer of insulation with specified fasteners in accordance with FM or UL requirements:
    - 1) Adhere second layer of insulation staggering joints from first layer.
    - 2) Lay insulation boards with edges in moderate contact without forcing.
    - 3) Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
    - 4) Apply no more insulation than can be sealed with membrane in same day.
3. Cover Board:
  - a. Adhere top layer of **1/2 inch (12.7 mm)** thick gypsum roof cover board.
4. SBS Cold Application Adhesive Modified Membrane:
  - a. Adhere base sheet, starting at low points. Lap **3 inches (75 mm)** on sides and **6 inches (150 mm)** on ends:
    - 1) Roll and broom into place.
  - b. Turn up layers and trim to top of cant strip on vertical surfaces. Adhere to cant strips.
  - c. Adhere cap sheet to base sheet in same manner with joints staggered.
  - d. No phase construction shall be allowed, for example, applying base sheet and later applying other sheets.
  - e. Broom plies of felt thoroughly into adhesive full felt width. Roofing having voids is subject to rejection.
  - f. Cut out and repair fishmouths, wrinkles, buckles or tears.
5. Base Flashing:
  - a. Install base flashing as specified in solid bed of flashing cement:
    - 1) Securely fasten flanges at minimum of **8 inches (200 mm)** on centers.
    - 2) Install (2) two plies of modified base sheet in adhesive over flange and feather onto roof membrane **3 inches (75 mm)** and **6 inches (150 mm)** respectively beyond outer edge of flange.
    - 3) Install metal roof scuppers on top of last ply of membrane of base flashing.
  - b. Base Flashing System:
    - 1) Solidly prime all metallic flashing surfaces with asphalt prime prior to waterproofing.
    - 2) Install base flashings at vertical intersections of roof deck and walls.

### 3.2 CLEAN-UP

- A. Remove from job site debris resulting from or incidental to this work. Clean or repair damage to Owner's satisfaction.

**END OF SECTION**

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**SECTION 07 6210****GALVANIZED STEEL FLASHING AND TRIM****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install miscellaneous flashing, counterflashing, and hold-down clips as described in Contract Documents and not specified to be of other material.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Miscellaneous sheet metal specialties not specified to be of other materials.
- C. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for wood base.
  - 2. Sections under 07 5000 heading: 'Membrane Roofing' for installation of miscellaneous roofing related flashing.
  - 3. Section 07 9213: 'Elastomeric Joint Sealant'.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A653/A653M-18, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - b. ASTM A792/A792M-10(2015), 'Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process'.
  - 2. Federal Specifications:
    - a. TT-S-00230C(2) Sealing Compound, Elastomeric Type, Single Component, (For Caulking, Sealing, and Glazing in Buildings and Other Structures).

**PART 2 - PRODUCTS****2.1 SYSTEM**

- A. Manufacturers:
  - 1. Type Two Acceptable Manufacturers Of Metal:
    - a. CMG – Coated Metals Group, Denver, CO [www.cmgmetals.com](http://www.cmgmetals.com).
    - b. Drexel Metals, LLC, Ivyland, PA [www.drexmet.com](http://www.drexmet.com).
    - c. Fabral, Lancaster, PA [www.fabral.com](http://www.fabral.com).
    - d. Firestone Metal Products, Anoka, MN [www.unaclad.com](http://www.unaclad.com).
    - e. MBCI, Houston, TX [www.mbc.com](http://www.mbc.com).
    - f. Metal Sales Manufacturing Corp, Sellersburg, IN [www.mtlsales.com](http://www.mtlsales.com).
    - g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO [www.ofrmetals.com](http://www.ofrmetals.com).
    - h. Petersen Aluminum Corp, Elk Grove, IL [www.pac-clad.com](http://www.pac-clad.com).
    - i. Ryerson, Chicago, IL [www.ryerson.com](http://www.ryerson.com).
    - j. Equal as approved by Architect before installation. See Section 01 6200.
- B. Materials:
  - 1. Sheet Metal:

- a. Galvanized iron or steel meeting requirements of ASTM A653/A653M, G 90 or Galvalume steel meeting requirements of ASTM A792/A792M AZ50, 50 ksi.
  - 1) 22 ga (0.792 mm) for hold-down clips.
  - 2) 24 ga (0.635 mm) for all other.
- C. Fabrication:
  1. Form accurately to details.
  2. Profiles, bends, and intersections shall be even and true to line.
  3. Fold exposed edges 1/2 inch (12.7 mm) to provide stiffness.
- D. Finish:
  1. Exposed to view:
    - a. Provide face coating of polyvinylidene Fluoride (PVF<sub>2</sub>) Resin-base finish (Kynar 500 or Hylar 5000) containing seventy (70) percent minimum PVF<sub>2</sub> in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
    - b. Reverse side coating shall be thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.
  2. Color as selected by Architect from Manufacturer's standard colors.

## 2.2 ACCESSORIES

- A. Sealants: Rubber base type conforming to Fed Spec TT-S-00230C.
- B. Fasteners:
  1. Of strength and type consistent with function.
  2. Nails: Hot-dipped galvanized.
  3. Screws, Bolts, And Accessory Fasteners: Galvanized or other acceptable corrosion resistant treatment.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install with small, watertight seams.
- B. Slope to provide positive drainage.
- C. Provide sufficient hold down clips to insure true alignment and security against wind.
- D. Provide 4 inch (100 mm) minimum overlap.
- E. Allow sufficient tolerance for expansion and contraction.
- F. Insulate work to prevent electrolytic action.

### 3.2 CLEANING

- A. Leave metals clean and free of defects, stains, and damaged finish.

**END OF SECTION**

**SECTION 07 9213****ELASTOMERIC JOINT SEALANTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install sealants not specified to be furnished and installed under other Sections.
  - 2. Quality of sealants to be used on Project not specified elsewhere, including submittal, material, and installation requirements.
  
- B. Related Requirements:
  - 1. Removing existing sealants specified in Sections where work required.
  - 2. Furnishing and installing of sealants is specified in Sections specifying work to receive new sealants.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Sealant Types and Classifications:
    - a. ASTM Specifications:
      - 1) Type:
        - a) Type S: Single-component sealant.
        - b) Type M: Multi-component sealant.
      - 2) Grade:
        - a) Grade P: Pourable or self-leveling sealant used for horizontal traffic joints.
        - b) Grade NS: Non-sag or gunnable sealant used for vertical and non-traffic joints.
      - 3) Classes: Represent movement capability in percent of joint width.
        - a) Class 100/50: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand of at least 100 percent increase and decrease of at least 50 percent of joint width as measured at time of application.
        - b) Class 50: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand increase and decrease of at least 50 percent of joint width as measured at time of application.
        - c) Class 25: Sealant that, when tested for adhesion or cohesion under cyclic movement shall withstand increase and decrease of at least 25 percent of joint width as measured at time of application.
        - d) Class 12: Sealant that, when tested for adhesion and cohesion under cyclic movement shall withstand increase and decrease of at least 12 percent of joint width as measured at time of application.
      - 4) Use:
        - a) T (Traffic): Sealant designed for use in joints in pedestrian and vehicular traffic areas such as walkways, plazas, decks and parking garages.
        - b) NT (Non-Traffic): Sealant designed for use in joints in non-traffic areas.
        - c) I (Immersion): Sealant that meets bond requirements when tested by immersion (Immersion rated sealant applications require primer).
        - d) M (Mortar): Sealant that meets bond requirements when tested on mortar specimens.
        - e) G (Glass): Sealant that meets bond requirements when tested on glass specimens.
        - f) A (Aluminum): Sealant that meets bond requirements when tested on aluminum specimens.

- g) O (Other): Sealant that meets bond requirements when tested on substrates other than standard substrates, being glass, aluminum, mortar.
- 2. Silicone: Any member of family of polymeric products whose molecular backbone is made up of alternating silicon and oxygen atoms and which has pendant hydrocarbon groups attached to silicon atoms. Used primarily as a sealant. Offers excellent resistance to water and large variations in temperature (minus 100 deg F to + 600 deg F) (minus 73.3 deg C to + 316 deg C).

B. Reference Standards:

- 1. ASTM International:
  - a. ASTM C920-14a, 'Standard Specification for Elastomeric Joint Sealants'.
  - b. ASTM C1193-16, 'Standard Guide for Use of Joint Sealants'.
  - c. ASTM C1330-18, 'Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants'.
  - d. ASTM C1481-12(2017) 'Standard Guide for Use of Joint Sealants with Exterior Insulation & Finish Systems (EIFS)'.
  - e. ASTM D5893/D5893M-16, 'Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements'.

### 1.3 ADMINISTRATIVE REQUIREMENTS

A. Scheduling:

- 1. Schedule work so waterproofing, water repellents and preservative finishes are installed after sealants, unless sealant manufacturer approves otherwise in writing.
- 2. Ensure sealants are cured before covering with other materials.

### 1.4 SUBMITTALS

A. Action Submittals:

- 1. Product Data:
  - a. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
  - b. Manufacturer's literature for each Product.
  - c. Schedule showing joints requiring sealants. Show also backing and primer to be used.

B. Informational Submittals:

- 1. Certificates:
  - a. Manufacturer's Certificate:
    - 1) Certify products are suitable for intended use and products meet or exceed specified requirements.
    - 2) Certificate from Manufacturer indicating date of manufacture.
- 2. Manufacturers' Instructions:
  - a. Manufacturer's installation recommendations for each Product.
  - b. Manufacturer's installation for completing sealant intersections when different materials are joined.
  - c. Manufacturer's installation for removing existing sealants and preparing joints for new sealant.

### 1.5 QUALITY ASSURANCE

A. Qualifications:

- 1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten (10) years documented experience.
- 2. Applicator Qualifications:
  - a. Company specializing in performing work of this section.

- b. Provide if requested, reference of projects with minimum three (3) years documented experience, minimum three (3) successfully completed projects of similar scope and complexity, and approved by manufacturer.
  - c. Designate one (1) individual as project foreman who shall be on site at all times during installation.
- B. Preconstruction Testing:
1. Pre-construction testing is not required when sealant manufacturer can furnish data acceptable to Architect based on previous testing for materials matching those of the Work.
- C. Mockups:
1. Provide mockups including sealant and joint accessories to illustrate installation quality and color if requested by Architect or Project Manager.
    - a. Incorporate accepted mockup as part of Work.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements:
1. Deliver and keep in original containers until ready for use.
  2. Inspect for damage or deteriorated materials.
- B. Storage and Handling Requirements:
1. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).
  2. Handle to prevent inclusion of foreign matter, damage by water, or breakage.
  3. Store in a cool dry location, but never under 40 deg F (4 deg C) or subjected to sustained temperatures exceeding 90 deg F (32 deg C) or as per Manufacturer's written recommendations.
  4. Do not use sealants that have exceeded shelf life of product.

## 1.7 FIELD CONDITIONS

- A. Ambient Conditions:
1. Do not install sealant during inclement weather or when such conditions are expected. Allow wet surfaces to dry.
  2. Follow Manufacturer's temperature recommendations for installing sealants.

## 1.8 WARRANTY

- A. Manufacturer Warranty:
1. Signed warranties against adhesive and cohesive failure of sealant and against infiltration of water and air through sealed joint for period of three (3) years from date of Substantial Completion.
    - a. Manufacturer's standard warranty covering sealant materials.
    - b. Applicator's standard warranty covering workmanship.

## PART 2 - PRODUCTS

### 2.1 SYSTEMS

- A. Manufacturers:
1. Manufacturer Contact List:
    - a. Dow Corning Corp., Midland, MI [www.dowcorning.com](http://www.dowcorning.com).
    - b. Franklin International, Inc. Columbus, OH [www.titebond.com](http://www.titebond.com).
    - c. GE Sealants & Adhesives (see Momentive Performance Materials Inc.).



- d. Laticrete International Inc., Bethany, CT [www.laticrete.com](http://www.laticrete.com).
- e. Momentive Performance Materials Inc. (formally GE Sealants & Adhesives), Huntersville, NC [www.ge.com/silicones](http://www.ge.com/silicones).
- f. Sherwin-Williams, Cleveland, OH [www.sherwin-williams.com](http://www.sherwin-williams.com).
- g. Sika Corporation, Lyndhurst, NJ [www.sikaconstruction.com](http://www.sikaconstruction.com) or Sika Canada Inc, Pointe Claire, QC [www.sika.ca](http://www.sika.ca).
- h. Tremco, Beachwood, OH [www.tremcosealants.com](http://www.tremcosealants.com) or Tremco Ltd, Toronto, ON (800) 363-3213.

B. Materials:

1. Design Criteria:

- a. Compliance: Meet or exceed requirements of these standards:
  - 1) ASTM C920: Elastomeric joint sealant performance standard.
  - 2) ASTM D5893/D5893M: Silicone Joint Sealant for Concrete Pavements.
- b. Comply with Manufacturer's ambient condition requirements.
- c. Sealants must meet Manufacturer's shelf-life requirements.
- d. Sealants must adhere to and be compatible with specified substrates.
- e. Sealants shall be stable when exposed to UV, joint movements, and environment prevailing at project location.
- f. Primers (Concrete, stone, masonry, and other nonporous surfaces typically do not require a primer. Aluminum and other nonporous surfaces except glass require use of a primer. Installer Option to use Adhesion Test to determine if primer is required or use primer called out in related sections):
  - 1) Adhesion Test:
    - a) Apply silicone sealant to small area and perform adhesion test to determine if primer is required to achieve adequate adhesion. If necessary, apply primer at rate and in accordance with Manufacturer's instructions. See 'Field Quality Control' in Part 3 of this specification for Adhesive Test.
    - 2) If Primer required, shall not stain and shall be compatible with substrates.
    - 3) Allow primer to dry before applying sealant.

2. Sealants At Exterior Building Elements:

- a. Description:
  - 1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
    - a) Louvers.
    - b) Wall penetrations.
    - c) Other joints necessary to seal off building from outside air and moisture.
- b. Design Criteria:
  - 1) Meet following standards for Sealant:
    - a) ASTM C920: Type S, Grade NS, Class 50 Use NT, M, G, A.
  - 2) Limitations:
    - a) Do not use below-grade applications.
    - b) Do not use on surfaces that are continuously immersed or in contact with water.
    - c) Do not use on wet, damp, frozen or contaminated surfaces.
    - d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.
  - 3) Color:
    - a) Architect to select from Manufacturer's standard colors.
    - b) Match building elements instead of window (do not use white that shows dirt easily).
- c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - 1) Dow Corning:
    - a) Primer: 1200 Prime Coat.
    - b) Sealant: 791 Silicone Weatherproofing Sealant.
  - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):
    - a) Primer: SS4044 Primer.
    - b) Sealant: GE SCS2000 SilPruf Silicone Sealant & Adhesive.
  - 3) Tremco:
    - a) Primer:
      - (1) Metal surface: No. 20 primer.

- (2) Porous surfaces: No. 23 primer.
- b) Sealant: Spectrum 1 Silicone Sealant.
- 3. Sealants At Exterior Sheet Metal And Miscellaneous:
  - a. Description:
    - 1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
      - a) Flashings.
      - b) Roof vents and flues.
  - b. Design Criteria:
    - 1) Meet following standards for Sealant:
      - a) ASTM C920: Type S Grade NS, Class 25 (min) Use NT, M, G, A and O.
    - 2) Limitations:
      - a) Do not use below-grade applications.
      - b) Do not use on surfaces that are continuously immersed or in contact with water.
      - c) Do not use on wet, damp, frozen or contaminated surfaces.
      - d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Dow Corning: 790 Silicone Building Sealant.
    - 2) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2350 Silicone Elastomeric Sealant.
    - 3) Tremco: Tremsil 600 Silicone Sealant.
- 4. General Interior Sealants:
  - a. General:
    - 1) Inside jambs and heads of exterior door frames.
    - 2) Both sides of interior door frames.
    - 3) Miscellaneous gaps between substrates.
  - b. Design Criteria:
    - 1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.
    - 2) 100 percent silicone sealant.
  - c. Non-Paintable Sealant (Installer Option A):
    - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - a) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.
      - b) Laticrete: Latasil Silicone Sealant.
      - c) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2800 SilGlaze II Silicone Sealant.
      - d) Sherwin Williams: White Lightning Silicone Ultra Low Odor Window and Door Sealant.
      - e) Tremco: Tremsil 200 Silicone Sealant.
      - f) Franklin International: Titebond 2601 (White) 2611 (Clear) 100% Silicone Sealant.
  - d. Paintable Sealant (Installer Option B):
    - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - a) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS7000 Paintable Silicone Sealant.
- C. Bond Breaker Tape:
  - 1. Pressure sensitive tape as by Sealant Manufacturer to suit application.
  - 2. Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement.
- D. Joint Backing:
  - 1. Comply with ASTM C1330.
  - 2. Flexible closed cell, non-gassing polyurethane or polyolefin rod or bond breaker tape as recommended by Sealant Manufacturer for joints being sealed.
  - 3. Oversized 25 to 50 percent larger than joint width.
- E. Joint Cleaner:
  - 1. Non-corrosive and non-staining type as recommended by Sealant Manufacturer, compatible with joint forming materials.

- F. Masking Tape:
  - 1. Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verification Of Conditions:
  - 1. Examine substrate surfaces and joint openings are ready to receive Work.
    - a. Verify each sealant is compatible for use with joint substrates.
    - b. Verify joint surfaces are clean and dry.
    - c. Ensure concrete surfaces are fully cured.
  - 2. Sealants provided shall meet Manufacturer's shelf-life requirements.
  - 3. Notify Architect of unsuitable conditions in writing.
    - a. Do not proceed until unsatisfactory conditions are corrected.
  - 4. Commencement of Work by installer is considered acceptance of substrate.

### **3.2 PREPARATION**

- A. Surface Preparation:
  - 1. Remove existing joint sealant materials where specified.
    - a. Clean joint surfaces of residual sealant and other contaminates capable of affecting sealant bond to joint surface using manufacturer's recommended joint preparation methods.
    - b. Repair deteriorated or damaged substrates as recommended by Sealant Manufacturer to provide suitable substrate. Allow patching materials to cure.
  - 2. Surfaces shall be clean, dry, free of dust, oil, grease, dew, frost or incompatible sealers, paints or coatings that may interfere with adhesion. Prepare substrates in accordance with Manufacturer's instructions:
    - a. Porous surfaces: Clean by mechanical methods to expose sound surface free of contamination and laitance followed by blasting with oil-free compressed air.
    - b. Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193. Allow solvent to evaporate prior to sealant application.
    - c. High-pressure water cleaning: Exercise care that water does not enter through failed joints.
    - d. Primers:
      - 1) Primers enhance adhesion ability.
      - 2) Use of primers is not a substitution for poor joint preparation.
      - 3) Primers should be used always in horizontal application where there is ponding water.
  - 3. Field test joints in inconspicuous location.
    - a. Verify joint preparation and primer required to obtain optimum adhesion of sealants to joint substrate.
    - b. When test indicates sealant adhesion failure, modify joint preparation primer, or both and retest until joint passes sealant adhesion test.
  - 4. Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.
- B. Joints:
  - 1. Prepare joints in accordance with ASTM C1193.
    - a. Clean joint surfaces of contaminates capable of affecting sealant bond to joint surface using Manufacturer's recommended instructions for joint preparation methods.
    - b. Remove dirt, dust, oils, wax, paints, and contamination capable of affecting primer and sealant bond.
    - c. Clean concrete joint surfaces to remove curing agents and form release agents.
- C. Protection:
  - 1. Protect elements surrounding the Work of this section from damage or disfiguration.

### 3.3 APPLICATION

- A. General:
1. Apply silicone sealant in accordance with Manufacturer's instructions.
  2. Do not use damaged or deteriorated materials.
  3. Install primer and sealants in accordance with ASTM C1193 and Manufacturer's instructions.
  4. Apply primer where required for sealant adhesion.
  5. Install sealants immediately after joint preparation.
  6. Do not use silicone sealant as per the following:
    - a. Apply caulking/sealant at temperatures below 40 deg F (4 deg C).
    - b. Below-grade applications.
    - c. Brass and copper surfaces.
    - d. Materials bleeding oils, plasticizers, and solvents.
    - e. Structural glazing and adhesive.
    - f. Surfaces to be immersed in water for prolonged time.
- B. Joint Backing:
1. Install joint backing to maintain sealant joint ratios recommended by Manufacturer.
  2. Install without gaps, twisting, stretching, or puncturing backing material. Use gage to ensure uniform depth to achieve correct profile, coverage, and performance.
  3. Rod for open joints shall be at least 1-1/2 times width of open joint and of thickness to give solid backing. Backing shall fill up joint so depth of sealant bite is no more than 3/8 inch (9.5 mm) deep.
- C. Bond Breaker:
1. Install bond breaker where joint backing is not used or where backing is not feasible.
    - a. Apply bond-breaker tape in shallow joints as recommended by Sealant Manufacturer.
- D. Sealant:
1. Apply sealant with hand-caulking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint. Apply sealants in vertical joints from bottom to top.
  2. Fill joint opening to full and proper configuration.
  3. Apply in continuous operation.
  4. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface. Tool joints in opposite direction from application direction, i.e., in vertical joints, from the top down. Do not 'wet tool' sealants.
  5. Depth of sealant bite shall be 1/4 inch (6 mm) minimum and 1/2 inch (12.7 mm) maximum, but never more than one half or less than one fourth joint width.
- E. Caulk gaps between painted or coated substrates and unfinished or pre-finished substrates. Caulk gaps larger than 3/16 inch (5 mm) between painted or coated substrates.

### 3.4 TOLERANCES

- A. Provide joint tolerances in accordance with Manufacturer's printed instructions.

### 3.5 FIELD QUALITY CONTROL

- A. Adhesion Test (Installer Option to use adhesion test to determine if primer is required).
1. Perform adhesion tests in accordance with Manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant joint Hand-Pull Tab:
    - a. Perform five (5) tests for first 1,000 linear feet (300 meters) of applied silicone sealant and one (1) test for each 1,000 linear feet (300 meters) seal thereafter or perform one (1) test per floor per building elevation minimum.
    - b. For sealants applied between dissimilar materials, test both sides of joints.

2. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
3. Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

### **3.6 CLEANING**

- A. Remove masking tape and excess sealant.
- B. Clean adjacent materials, which have been soiled, immediately (before setting) as recommended by Manufacturer.
- C. Waste Management: Dispose of products in accordance with manufacturer's recommendation.

**END OF SECTION**

## **DIVISION 08: OPENINGS**

### **08 0100 OPERATION AND MAINTENANCE OF OPENINGS**

08 0601 HARDWARE GROUP AND KEYING SCHEDULES

### **08 1000 DOORS AND FRAMES**

08 1213 HOLLOW METAL FRAMES

08 1429 FLUSH WOOD DOORS: FACTORY-FINISHED, CLEAR

### **08 7000 HARDWARE**

08 7101 COMMON FINISH HARDWARE REQUIREMENTS

08 7102 HANGING DEVICES

08 7103 SECURING DEVICES

08 7108 STOPS AND HOLDERS

08 7109 ACCESSORIES

END OF TABLE OF CONTENTS

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**SECTION 08 0601**

**HARDWARE GROUP AND KEYING SCHEDULES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install door hardware and keying as described in Contract Documents.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Builders Hardware Manufacturer's Association (BHMA) Hardware Functions:
    - a. F81 Office Door Lock: Dead locking latch bolt operated by lever from either side, except when outside lever is locked by turn button in inside lever. When outside lever is locked, latch bolt is operated by key in outside lever or by rotating inside lever. Turn button must be manually rotated to unlock outside lever.

**1.3 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery And Acceptance Requirements:
  - 1. Materials shall be delivered in original, unopened packages with labels intact.

**PART 2 - HARDWARE GROUPS**

**2.1 INTERIOR DOORS**

- A. Single Interior Doors:
  - 1. **Group 26:**
    - a. 1 set: Smoke Gaskets.
    - b. 1 each: Acoustic Seal.
    - c. 3 each: Hinges.
    - d. 1 each: Lockset Function F81.
    - e. 1 each: Stop.
    - f. 1 each: Threshold.

**PART 3 - KEYING SCHEDULE for FINISH HARDWARE**

**3.1 KEYING SCHEDULE**

- A. Meetinghouse Keying Schedule:

- 1. Mechanical:

Key	Stamped	Amount	
XAA13	MECH	2	Match existing building key system

**END OF SECTION**



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**SECTION 08 1213****HOLLOW METAL FRAMES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
  - 1. Hollow metal frames.
- B. Related Requirements:
  - 1. Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for installation.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. American Architectural Manufacturers Association / Window & Door Manufacturers Association / CSA Group:
    - a. AAMA/WDMA/CSA 101/I.S.2/A440-17, 'North American Fenestration Standard/Specification for windows, doors, and skylights'.
  - 2. ASTM International:
    - a. ASTM A568/A568M-17a, 'Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
    - b. ASTM A653/A653M-17, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
  - 3. Steel Door Institute:
    - a. SDI A250.8-2017, 'Specifications for Standard Steel Doors and Frames'.
    - b. SDI A250.11-2012, 'Recommended Erection Instructions for Steel Frames'.

**1.3 SUBMITTALS**

- A. Informational Submittals:
  - 1. Copy of SDI A250.11.

**PART 2 - PRODUCTS****2.1 MANUFACTURED UNITS**

- A. Suppliers:
  - 1. Category Three Approved Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
    - a. Architectural Building Supply, Salt Lake City, UT [www.cookandboardman.com](http://www.cookandboardman.com):
      - 1) Contact Information: Russ Farley: phone (800) 574-4369, fax 801-484-6817, or e-mail [russf@absdoors.com](mailto:russf@absdoors.com).
    - b. Beacon Metals Inc, Salt Lake City, UT [www.beacon-metals.com](http://www.beacon-metals.com):
      - 1) Contact Information: Jared Butler: phone (801) 486-4884, cell (435) 216-2297, FAX 801-485-7647, or e-mail [Jared@beacon-metals.com](mailto:Jared@beacon-metals.com).
    - c. Midwest D-Vision Solutions, Salt Lake City, UT [www.mwdsutah.com](http://www.mwdsutah.com).
      - 1) Contact Information: Dan Mercer, office (801) 377-4355, cell (801) 618-9456, e-mail [danm@mwdsutah.com](mailto:danm@mwdsutah.com).

- B. Manufacturers:
1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Any current member of Steel Door Institute.
- C. Frames:
1. Cold rolled furniture steel:
    - a. Interior Frames: 16 ga. (1.6 mm).
  2. Provide labeled frame to match fire rating of door.
  3. Finish:
    - a. Use one of following systems:
      - 1) Prime surfaces with rust inhibiting primer.
      - 2) Galvanize.
  4. Anchors: 16 US ga (1.6 mm) minimum meeting UL or other code acceptable requirements for door rating involved.
- D. Fabrication:
1. General Requirements:
    - a. Frames shall be welded units. Provide temporary spreader on each welded frame.
    - b. Provide Manufacturer's gauge label for each item.
    - c. Make breaks, arrises, and angles uniform, straight, and true. Accurately fit corners.
  2. Frame width dimension:
    - a. Fabricate frame 1/8 inch (3 mm) wider than finished wall thickness as described in Contract Documents.
  3. Provide mortar guards at strikes and hinges.
  4. Anchors:
    - a. Provide three jamb anchors minimum for each jamb. On hinge side, install one anchor at each hinge location. On strike side, install one anchor at strike level and anchors at same level as top and bottom hinges. Tack weld anchors on frames intended for installation in framed walls.
    - b. Frames installed before walls are constructed shall be provided with extended base anchors in addition to other specified anchors.
    - c. Anchor types and configurations shall meet wall conditions.

**PART 3 - EXECUTION: Not Used**

**END OF SECTION**

**SECTION 08 1429****FLUSH WOOD DOORS: Factory-Finished, Clear****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
  - 1. Factory-finished flush wood doors.
- B. Related Requirements:
  - 1. Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for installation.
  - 2. Section 09 9324: 'Interior Clear-Finished Hardwood'.

**1.2 REFERENCES**

- A. Abbreviations And Acronyms:
  - 1. AWS: Architectural Woodwork Standards (formerly AWI).
  - 2. FD: Fire-resistant core, fire-resistant materials assembled to stiles and rails according to methods prescribed by the testing agency to meet rigorous smoke, flame, and pressure tests.
  - 3. FD-5: Core with 2 layers on each side.
  - 4. ME: Matching edges, i.e., vertical edges same as decorative faces.
  - 5. PC: Particleboard core, solid core door with stiles and rails bonded to the core and abrasive planed flat prior to the application of the faces.
  - 6. PC-5: Core with 2 layers on each side.
- B. Association Publications:
  - 1. Architectural Woodwork Institute / Architectural Woodwork Manufacturers Association of Canada, 46179 Westlake Drive, Suite 120, Potomac Falls, VA [www.awinet.org](http://www.awinet.org).
    - a. Architectural Woodwork Standards (AWS), 2nd Edition, 2014.
- C. Definitions:
  - 1. Book-Match: Matching between adjacent veneer leaves on one panel face. Every other piece of veneer is turned over so that the adjacent leaves are "opened" as two pages in a book. The fibers of the wood, slanting in opposite directions in the adjacent leaves, create a characteristic light and dark effect when the surface is seen from an angle.
  - 2. Fire-rated: Fire-retardant particleboard with an Underwriters' Laboratory (UL) stamp for Class 1 fire rating (Flame Spread 20, Smoke Developed 25). Fire-rated doors are available with particleboard and mineral cores for ratings up to 1-1/2 hours.
  - 3. Fire-rated Door: A door made of fire-resistant material that can be closed to prevent the spread of fire and can be rated as resisting fire for 20 minutes (1/3 hour), 30 minutes (1/2 hour), 45 minutes (3/4 hour) (C), 1 hour (B), or 1-1/2 hours (B). The door must be tested and carry an identifying label from a qualified testing and inspection agency.
  - 4. Grade: Unless otherwise noted, this term means Grade rules for Economy, Custom, and/or Premium Grade.
    - a. Custom Grade: Typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.
    - b. Premium Grade: The highest Grade available in both material and workmanship where the highest level of quality, materials, workmanship, and installation is required.
  - 5. Running Match: Each panel face is assembled from as many veneer leaves as necessary. Any portion left over from one panel may be used to start the next.
- D. Reference Standards:

1. American Architectural Manufacturers Association / Window & Door Manufacturers Association / CSA Group:
  - a. AAMA/WDMA/CSA 101/I.S.2/A440-17, 'North American Fenestration Standard/Specification for windows, doors, and skylights'
2. ASTM International:
  - a. ASTM C1036-16, 'Standard Specification for Flat Glass'.
  - b. ASTM C1048-18, 'Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass'.
3. Hardwood, Plywood, and Veneer Association:
  - a. HPVA HP-1-2016 'Standard for Hardwood and Decorative Plywood'.
4. National Particleboard Association / Composite Panel Association:
  - a. NPA A208.1-2009, 'Particleboard'.

### 1.3 SUBMITTALS

#### A. Action Submittals:

##### 1. Shop Drawings:

- a. Schedule showing type of door at each location. Included shall be size, veneer, core type, fire rating, hardware prep, openings, blocking, etc.
- b. Indicate factory finish color and type.

##### 2. Samples:

###### a. Interior Hardwood for Transparent Finish:

- 1) Before performing work of this Section, prepare Control Sample, to match sample available from Owner, to be used as finishing standard for interior clear finished hardwood as specified in Section 09 9324.
- 2) Design Criteria:
  - a) Provide **8 inch by 10 inch (200 mm by 255 mm)** sample of Birch to match Owner provided stain color selected for Project.
  - b) Control Sample will be used as performance standard for evaluating finish provided.

#### B. Informational Submittals:

##### 1. Source Quality Control Submittals:

###### a. Samples:

###### 1) Interior Hardwood for Transparent Finish:

- a) Owner will provide Control Sample from project for finish.

#### C. Closeout Submittals:

##### 1. Include following information in Operations And Maintenance Manuals specified in Section 01 7800:

###### a. Record Documentation:

###### 1) Manufacturers Documentation:

- a) Manufacturer's product literature on doors and factory finish.
- b) Maintenance and repair instructions.

### 1.4 DELIVERY, STORAGE, AND HANDLING

#### A. Delivery And Acceptance Requirements:

1. Deliver in clean truck and, in wet weather, under cover.
2. Deliver to building site only after plaster, cement, and taping compound are completed and dry and after interior painting operations have been completed.
3. Individually wrap in polyethylene bags for shipment and storage.

#### B. Storage And Handling Requirements:

1. Store doors in a space having controlled temperature and humidity range between 25 and 55 percent.
2. Store flat on level surface in dry, well ventilated space.

3. Cover to keep clean but allow air circulation.
4. Do not subject doors to direct sunlight, abnormal heat, dryness, or humidity.
5. Handle with clean gloves and do not drag doors across one another or across other surfaces.
6. Leave shipping bag on door after installation until immediately before substantial completion inspection.
7. Doors have been acclimated to the field conditions for a minimum of 72 hours before installation is commenced.

## 1.5 WARRANTY

### A. Manufacturer Warranty:

1. Manufacturer's standard full door warranty for lifetime of original installation.
  - a. Warranty shall include finishing, hanging, and installing hardware if manufacturing defect was discovered after door was finished and installed.
  - b. Warranty to include defects in materials including following:
    - 1) Delaminating in any degree.
    - 2) Warp or twist of **1/4 inch (6 mm)** or more in door panel at time of one-year warranty inspection.
    - 3) Telegraphing of core assembly: Variation of **1/100 inch (0.25 mm)** or more in **3 inch (75 mm)** span.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURED UNITS

#### A. Suppliers:

1. Category Three Approved Suppliers. See Section 01 6200 for definitions of Categories and Section 01 4301 for Qualification Requirements:
  - a. Architectural Building Supply, Salt Lake City, UT [www.cookandboardman.com](http://www.cookandboardman.com):
    - 1) Contact Information: Russ Farley: phone (800) 574-4369, fax 801-484-6817, or e-mail [russf@absdoors.com](mailto:russf@absdoors.com).
  - b. Beacon Metals Inc, Salt Lake City, UT [www.beacon-metals.com](http://www.beacon-metals.com):
    - 1) Contact Information: Jared Butler: phone (801) 486-4884, cell (435) 216-2297, FAX 801-485-7647, or e-mail [Jared@beacon-metals.com](mailto:Jared@beacon-metals.com).
  - c. Midwest D-Vision Solutions, Salt Lake City, UT [www.mwdsutah.com](http://www.mwdsutah.com).
    - 1) Contact Information: Dan Mercer, office (801) 377-4355, cell (801) 618-9456, e-mail [danm@mwdsutah.com](mailto:danm@mwdsutah.com).

#### B. Manufacturers:

1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
  - a. Graham Wood Doors, Mason City, IA.
  - b. Marshfield Door Systems Inc, Marshfield, WI.
  - c. VT Industries, Holstein, IA.

#### C. Wood Doors:

1. Type: AWS PC-5ME or FD-5ME.
2. Grade: AWS Premium, except face veneer.
3. Fully Type I Construction: Adhere all glue lines with Type I adhesive, including veneer lay-up.
4. Face Veneer:
  - a. Plain sliced Birch meeting requirements of AWS Grade A, **1/50 inch (0.5 mm)** thick minimum immediately before finishing.
  - b. Face veneers shall be running book matched.
5. Core:
  - a. Fully bonded to stiles and rails and sanded as a unit before applying veneers.
  - b. Non-Rated:

- 1) 32 lb density meeting requirements of ANSI A208.1 Mat Formed Wood Particle Board, Grade 1-L-1 minimum.
- 2) Stiles:
  - a) 1-3/8 inches (35 mm) deep minimum before fitting.
  - b) Stile face to be hardwood matching face veneer material, thickness manufacturer's standard.
- 3) Rails:
  - a) 1-1/8 inches (28 mm).
  - b) Manufacturer's option.

D. Fabrication:

1. Doors shall be factory-machined. Coordinate with Section 08 1213 and Sections under 08 7000.

E. Finishes:

1. Factory Finishing:
  - a. Applied by Door Manufacturer before leaving factory.
  - b. Performance / Design Criteria:
    - 1) Finish factory-finish to match Owner selected sample as specified in Section 09 9324.
  - c. Match existing Project Color Scheme:
    - 1) Control Sample provided by Owner:
      - a) Control Sample will be existing wood item from Project.
  - d. Finish: AWS Finish System TR-6 Catalyzed Polyurethane Premium Grade for unfilled, open-grain woods.

## 2.2 SOURCE QUALITY CONTROL

A. Inspections:

1. Verification of Performance:
  - a. Doors shall have following information permanently affixed on top of door:
    - 1) Manufacturer:
    - 2) Door designation or model.
    - 3) Veneer species.
    - 4) Factory finish.
2. Clear Finished Hardwood:
  - a. Color matches Owner provided sample specified in Section 09 9324.

## PART 3 - EXECUTION: Not Used

END OF SECTION

**SECTION 08 7101****COMMON FINISH HARDWARE REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. General requirements for finish hardware related to architectural wood and hollow metal doors.
- B. Related Requirements:
  - 1. Section 06 2024: 'Door, Frame, And Finish Hardware Installation' for installation of hardware.
  - 2. Section 08 0601: 'Hardware Group and Keying Schedules'.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. Builders Hardware Manufacturers Association (BHMA), 355 Lexington Avenue, 15th Floor, New York, NY 10017-6603, Tel: 212-297-2122 Fax: 212-370-9047, [www.buildershardware.com](http://www.buildershardware.com).
- B. Reference Standards:
  - 1. International Code Council / American National Standards Institute:
    - a. ICC / ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.
  - 2. Underwriters Laboratories (UL):
    - a. UL 10B, 'Fire Tests of Door Assemblies' (10th Edition).
    - b. UL 10C, 'Positive Pressure Fire Tests of Door Assemblies' (Third Edition).

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Hardware Templates:
    - a. Provide hardware templates to Sections 08 1213, 08 1313, and 08 1429 within fourteen (14) days after Architect approves hardware schedule.
    - b. Supply necessary hardware installation templates to Section 06 2024 before pre-installation conference.

**1.4 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's cut sheets.
    - b. Two (2) copies of Manufacturer's installation, adjustment, and maintenance instructions for each piece of hardware. Include one (1) set in 'Operations And Maintenance Manual' and send one (1) set with hardware when delivered.
    - c. Copy of hardware schedule.
    - d. Written copy of keying system explanation.
  - 2. Shop Drawings:
    - a. Submit hardware schedule indicating hardware to be supplied.
    - b. Schedule shall indicate details such as proper type of strikeplates, spindle lengths, hand, backset, and bevel of locks, hand and degree opening of closer, length of kickplates, length of rods and flushbolts, type of door stop, and other necessary information necessary to determine exact hardware requirements.



- B. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Manufacturer's installation, adjustment, and maintenance instructions for each piece of hardware.
    - b. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature and/or cut sheets.
        - b) Include keying plan and bitting schedule.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Storage And Handling Requirements:
1. Neatly and securely package hardware items by hardware group and identify for individual door with specified group number and set number used on Supplier's hardware schedule.
  2. Include fasteners and accessories necessary for installation and operation of finish hardware in same package.

## PART 2 - PRODUCTS

### 2.1 SUPPLIERS

- A. Existing Projects (Doors and Door Hardware):
1. USA Projects:
    - a. Category Three Approved Suppliers. See Section 01 6200 for definitions of Categories:
      - 1) Architectural Building Supply, Salt Lake City, UT [www.cookandboardman.com](http://www.cookandboardman.com):
        - a) Contact Information: Russ Farley: phone (800) 574-4369, fax 801-484-6817, or e-mail [russf@absdoors.com](mailto:russf@absdoors.com).
      - 2) Beacon Metals Inc, Salt Lake City, UT [www.beacon-metals.com](http://www.beacon-metals.com):
        - a) Contact Information: Jared Butler: phone (801) 486-4884, cell (435) 216-2297, FAX 801-485-7647, or e-mail [Jared@beacon-metals.com](mailto:Jared@beacon-metals.com).
      - 3) Midwest D-Vision Solutions, Salt Lake City, UT [www.mwdsutah.com](http://www.mwdsutah.com).
        - a) Contact Information: Dan Mercer, office (801) 377-4355, cell (801) 618-9456, e-mail [danm@mwdsutah.com](mailto:danm@mwdsutah.com).
- B. Hardware Finishes:
1. Finishes for brass or bronze hardware items shall be:
    - a. ANSI / BHMA Finish Code 626.
      - 1) Description: Satin Chromium Plated.
      - 2) Base Metal: Brass. Bronze.
  2. Finishes for flat goods items may be:
    - a. ANSI / BHMA Finish Code 630.
      - 1) Description: Satin Stainless Steel.
      - 2) Base Metal: Stainless Steel (300 Series).
  3. Materials other than steel, brass, or bronze shall be finished to match appearance satin chromium plated, except flat goods which shall be satin stainless steel.

### 2.2 FASTENERS

- A. Fasteners shall be of suitable types, sizes and quantities to properly secure hardware. Fasteners shall be of same material and finish as hardware unless otherwise specified. Fasteners exposed to weather shall be non-ferrous or corrosion resisting steel.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- A. Before ordering materials, examine Contract Documents to be assured that material to be ordered is appropriate for thickness and substrate to which it is to be secured and will function as intended.

**END OF SECTION**

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**SECTION 08 7102****HANGING DEVICES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
  - 1. Hinges for flush wood and hollow metal doors.
- B. Related Requirements:
  - 1. Section 08 7101: 'Common Hardware Requirements'.

**PART 2 - PRODUCTS****2.1 MANUFACTURED UNITS**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Hager Companies, St Louis, MO [www.hagerhinge.com](http://www.hagerhinge.com).
    - b. Ives, New Haven, CT [www.iveshardware.com](http://www.iveshardware.com).
    - c. McKinney, Scranton, PA [www.mckinneyhinge.com](http://www.mckinneyhinge.com).
    - d. PBB, Ontario, CA [www.pbbinc.com](http://www.pbbinc.com).
    - e. Stanley (dormakaba Americas), Indianapolis IN [www.stanleyhardwarefordoors.com/products/](http://www.stanleyhardwarefordoors.com/products/).
- B. Hinges:
  - 1. Doors:
    - a. Sizes:
      - 1) Non-Fire-Rated Doors:
        - a) 1-3/4 inch 44.5 mm non-fire-rated wood doors in wood frames: 4 inches by 4 inches (100 mm by 100 mm).
        - b) 1-3/8 inch 35 mm wood or metal doors: 3-1/2 inches by 3-1/2 inches (89 mm by 89 mm).
  - 2. Use non-removable pins on exterior opening doors.
  - 3. Hinges on exterior doors shall be solid brass, plated to achieve specified finish.
  - 4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Interior:
      - 1) Hager: BB 1279.
      - 2) Ives: 5BBI.
      - 3) McKinney: TA 2714.
      - 4) MacPro / McKinney: MPB79.
      - 5) PBB: BB81.
      - 6) Stanley: FBB 179.
    - b. Exterior:
      - 1) Hager: BB 1191.
      - 2) Ives: 5BBI.
      - 3) McKinney: TA 2314.
      - 4) PBB: BB21.
      - 5) Stanley: FBB 191.

**PART 3 - EXECUTION: Not Used**

**END OF SECTION**

**SECTION 08 7103**  
**SECURING DEVICES**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
  - 1. Items for architectural wood or hollow metal doors:
    - a. Locksets and latchsets.
- B. Related Requirements:
  - 1. Section 08 7101: Common Hardware Requirements.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Grade 1 Heavy Duty Key-In Lever Cylindrical Lockset:
    - a. Performance Features:
      - 1) Exceeds 1,000,000 ANSI cycles.
      - 2) Clutching mechanism standard.
      - 3) Thru-bolt design and heavy-duty spring tension provides longer performance life and prevents lever sag.
      - 4) ADA-compliant thumbturn.
      - 5) Mortise case is easily field reversible.
      - 6) Pre-assembled trims with spring-loaded spindles automatically adjust to door thickness.
      - 7) Partial security separator prevents spindle manipulation.
      - 8) Anti-friction throwbolt.
  - 2. Grade 2 Standard Duty Key-In Lever Cylindrical Lockset:
    - a. Performance Features:
      - 1) Exceeds 400,000 ANSI cycles.
      - 2) Single motion egress provides easy emergency exit.
      - 3) Full 1 inch (25 mm) throwbolt with saw resistant hardened steel roller pin.
      - 4) Anti-drill design deadbolt. Two (2) ball bearings inserted to prevent drill attacks.
      - 5) ADA-compliant thumbturn.

**1.3 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery And Acceptance Requirements:
  - 1. Standard Key Delivery:
    - a. Include change keys with hardware.

**PART 2 - PRODUCTS****2.1 MANUFACTURED UNITS**

- A. Manufacturers:
  - 1. Manufacturer List:
    - a. Best Locks by Stanley, Indianapolis IN [www.stanleysecuritysolutions.com](http://www.stanleysecuritysolutions.com).
    - b. Glynn-Johnson, Indianapolis, IN [www.glynn-johnson.com](http://www.glynn-johnson.com).
    - c. Hager, St Louis, MO [www.hagerhinge.com](http://www.hagerhinge.com).

- d. Ives, New Haven, CT [www.iveshardware.com](http://www.iveshardware.com).
  - e. Knape & Vogt, Grand Rapids, MI [www.knapeandvogt.com](http://www.knapeandvogt.com).
  - f. Marks USA, Amityville, NY [www.marksusa.com](http://www.marksusa.com).
  - g. Precision Hardware, Romulus, MI [www.precisionhardware.com](http://www.precisionhardware.com).
  - h. Rockwood, Manufacturing Co, Rockwood, PA [www.rockwoodmfg.com](http://www.rockwoodmfg.com).
  - i. Sargent, New Haven, CT [www.sargentlock.com](http://www.sargentlock.com).
  - j. Schlage, Colorado Springs, CO [www.schlage.com](http://www.schlage.com).
  - k. Von Duprin, Indianapolis, IN [www.vonduprin.com](http://www.vonduprin.com).
  - l. Yale Commercial Locks, Lenoir City, TN [www.yalecommercial.com](http://www.yalecommercial.com).
- B. General:
- 1. Backsets shall be **2-3/4 inches (70 mm)**.
  - 2. Furnish lead shields where required.
- C. Locksets And Latchsets:
- 1. Design Criteria:
    - a. Grade 2 Standard Duty Key-In Lever Cylindrical Lockset:
      - 1) ANSI/BHMA A156.02 Series 4000 Grade 2.
      - 2) Meet UL 3 hour fire rating.
      - 3) Meet ADA Compliant ANSI A117.1 Accessibility Code.
      - 4) Door Lever:
        - a) Meet California code for **1/2 inch (12.7 mm)** or less return to door.
  - 2. Lever Operated:
    - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) Grade 2 Standard Duty Key-In Lever Cylindrical Locksets:
        - a) 7K Series Best Lock with 15D Lever by Stanley standard cylinders - (I/C cores may be used when authorized by AEC).
        - b) 175 Series with American Lever by Marks USA.
        - c) 7 Line Series with L Lever by Sargent.
        - d) AL Series with Saturn (SAT) Lever by Schlage.
        - e) 5300LN Series with Augusta (AU) Lever by Yale.

## PART 3 - EXECUTION

### 3.1 CLOSE-OUT ACTIVITIES

- A. Owner's Instructions:
- 1. Before Final Acceptance Meeting, send master keys to Facilities Manager.

**END OF SECTION**

**SECTION 08 7108****STOPS AND HOLDERS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Supplied But Not Installed Under This Section:
  - 1. Door stops.
- B. Related Sections:
  - 1. Section 08 7101: Common Hardware Requirements.

**PART 2 - PRODUCTS****2.1 MANUFACTURED UNITS**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Glynn-Johnson, Indianapolis, IN [www.glynn-johnson.com](http://www.glynn-johnson.com).
    - b. Hager, St Louis, MO [www.hagerhinge.com](http://www.hagerhinge.com).
    - c. Ives, Wallingford, CT [www.iveshardware.com](http://www.iveshardware.com).
    - d. Rockwood Manufacturing Co, Rockwood, PA [www.rockwoodmfg.com](http://www.rockwoodmfg.com).
    - e. Sargent, New Haven, CT (800) 906-6606 or (203) 562-2151 [www.sargentlock.com](http://www.sargentlock.com).
- B. Stops:
  - 1. Use wall type stops unless indicated otherwise on Door Schedule.
  - 2. Provide model appropriate for substrate. Wall stops may be either cast or wrought.
  - 3. Type Two Acceptable Products:
    - a. Interior Wall
    - b. Hager 236W
    - c. Ives WS407CCV
    - d. Rockwood 409
    - e. Glynn Johnson - - -
    - f. Sargent - - -
    - g. Equal as approved by Architect before Installation. See Section 01 6200.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Interface With Other Work: When using overhead stops, coordinate installation with door closer and other door hardware.

**END OF SECTION**



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**SECTION 08 7109****ACCESSORIES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under This Section:
  - 1. Acoustical seals.
  - 2. Smoke Gaskets.
  - 3. Thresholds (metal) where required for wood doors and hollow metal doors.
  - 4. Door bottoms/door sweeps.
- B. Related Requirements:
  - 1. Section 08 7101: 'Common Finish Hardware Requirements' for general finish hardware requirements and Approved Suppliers.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. American Architectural Manufacturers Association (AAMA):
    - a. AAMA 609 & 609-09, 'Cleaning and Maintenance Guide for Architecturally Finished Aluminum' (combined document).
    - b. AAMA 611-12, 'Voluntary Standards for Anodized Architectural Aluminum'.
    - c. AAMA 701/702-11, 'Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals'.
  - 2. National Association of Architectural Metal Manufacturers (NAAMM):
    - a. AMP 500-06, 'Metal Finishes Manual' for Architectural and Metal Products.
- B. Reference Standards:
  - 1. American National Standards Institute / Builders Hardware Manufacturers Association:
    - a. ANSI / BHMA A156.18-2012, 'Materials and Finishes'.
    - b. ANSI / BHMA A156.21-2014, 'American National Standard for Thresholds'.
  - 2. International Code Council / American National Standards Institute:
    - a. ICC / ANSI A117.1-2009, 'Accessible and Usable Buildings and Facilities'.

**PART 2 - PRODUCTS****2.1 MANUFACTURED UNITS**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Hager, St Louis, MO [www.hagerhinge.com](http://www.hagerhinge.com).
    - b. NGP - National Guard Products, Memphis, TN [www.ngpinc.com](http://www.ngpinc.com).
    - c. Pemko Manufacturing, Ventura, CA [www.pemko.com](http://www.pemko.com).
- B. Acoustical Seals:
  - 1. Color as selected by Architect.
  - 2. Type One Acceptable Products:
    - a. Door Bottom Shoe for Wood Door:
      - 1) 13VDkB by NGP.
      - 2) 211DV by Pemko.

- b. Door Bottom Shoe for Metal Door:
    - 1) 779S-A by Hager.
    - 2) 35EV by NGP.
    - 3) 217AV by Pemko.
  - c. Equal as approved by Architect before bidding. See Section 01 6200.
- C. Smoke Gaskets:
- 1. Color as selected by Architect.
  - 2. Type One Acceptable Products:
    - a. 726 by Hager.
    - b. 5050 by NGP.
    - c. PK 55 by Pemko.
    - d. Equal as approved by Architect before bidding. See Section 01 6200.
- D. Thresholds:
- 1. Type One Acceptable Products:
    - a. Design Criteria:
      - 1) Meet handicap accessibility requirements (ADA):
    - b. Interior Doors at Acoustic Seals, Approved Products:
      - 1) Carpet threshold (carpet to carpet):
        - a) 505S DBA by Hager.
        - b) 414 DKB by NGP.
        - c) 236 D by Pemko.
      - 2) Carpet threshold (carpet to concrete, wood, synthetic, or resilient flooring):
        - a) 417 DKB by NGP.
        - b) 174 D by Pemko.
      - 3) Saddle threshold:
        - a) 418S DBA by Hager.
        - b) 411 DKB by NGP.
        - c) 151 D by Pemko.
    - c. Equals as approved by Architect before bidding. See Section 01 6200.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install smoke gaskets and acoustical seals in manner to give continuous air-tight fit.
- 1. Install smoke gaskets as per Manufacturer's installation requirements:
    - a. Hinge Jamb: Install smoke gaskets on jamb face of door frame so door will compress smoke gasket.
    - b. Header and Strike Jamb: Install smoke gaskets on face of stop of door frame so door will compress smoke gasket.
  - 2. Install acoustical seal with seal under door.

**END OF SECTION**

## **DIVISION 09: FINISHES**

### **09 2000 PLASTER AND GYPSUM BOARD**

- 09 2216 NON-STRUCTURAL METAL FRAMING
- 09 2226 METAL SUSPENSION SYSTEM: GYPSUM BOARD
- 09 2900 GYPSUM BOARD

### **09 5000 CEILINGS**

- 09 5116 ACOUSTICAL TILE CEILINGS

### **09 7000 WALL FINISHES**

- 09 7226 SISAL WALL COVERINGS

### **09 9000 PAINTS AND COATINGS**

- 09 9001 COMMON PAINTING AND COATING REQUIREMENTS
- 09 9123 INTERIOR PAINTED GYPSUM BOARD, PLASTER
- 09 9124 INTERIOR PAINTED METAL
- 09 9125 INTERIOR PAINTED WOOD
- 09 9324 INTERIOR CLEAR-FINISHED HARDWOOD
- 09 9413 INTERIOR TEXTURED FINISHING

END OF TABLE OF CONTENTS

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**SECTION 09 2216****NON-STRUCTURAL METAL FRAMING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install metal framing and furring systems and blocking as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 06 1100: 'Wood Framing' for wood blocking.
  - 2. Section 09 2226: 'Metal Suspension System' for furring on suspended ceilings.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. Steel Framing Industry Association (SFIA):
    - a. SFIA 'Technical Guide for Cold-Formed Steel Framing Products', [www.sfia.net](http://www.sfia.net).
  - 2. Steel Stud Manufacturers Association (SSMA):
    - a. 2015 IBC - SSMA 'Product Technical Guide'.
- B. Definitions:
  - 1. Non-Structural Member: Member in steel-framed system that is not part of the gravity load resisting system, lateral force resisting system or building envelope.
- C. Reference Standards:
  - 1. American Iron and Steel Institute (AISI):
    - a. AISI S220-15, 'North American Specification For The Design Of Cold-Formed Steel Framing – Nonstructural Members'.
  - 2. ASTM International:
    - a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - b. ASTM A1003/A1003M-15, 'Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members'.
    - c. ASTM C645-18, 'Standard Specification for Nonstructural Steel Framing Members'.
    - d. ASTM C754-18, 'Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products'.
    - e. ASTM C1513-18, 'Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections'.
    - f. ASTM E119-18, 'Standard Test Methods for Fire Tests of Building Construction and Materials'.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conferences:
  - 1. Schedule pre-installation conference to be held after submittals have been reviewed and returned by Architect, but before beginning metal framing work.
  - 2. In addition to agenda items specified in Section 01 3100, review following:
    - a. Identify location of required blocking.

## 1.4 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Show special components and installations not fully dimensioned or detailed in Manufacturer's Product data.
- B. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. ATI, ICC or other Approved Testing Agency (active member) Evaluation Report.
  - 2. Manufacturer Instructions:
    - a. Technical product data, installation instructions, and recommendations for each component of system.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. ICC approved.

## PART 2 - PRODUCTS

### 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Type One Acceptable Manufacturers:
    - a. CEMCO, City of Industry, CA [www.cemcosteel.com](http://www.cemcosteel.com).
    - b. ClarkDietrich Building Systems, West Chester, OH [www.clarkdietrich.com](http://www.clarkdietrich.com).
    - c. Any member of Steel Framing Industry Association (SFIA).
    - d. Any member of Steel Stud Manufacturer's Association (SSMA).
    - e. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Materials:
  - 1. Framing:
    - a. General:
      - 1) **20 gauge** minimum, unless noted greater on Drawings, meeting requirements of ASTM C645.
      - 2) Steel Sheet Components: Comply with ASTM C645 requirements for metal unless otherwise indicated.
      - 3) Steel Coating Requirement: Comply with ASTM C645 roll-formed from hot dipped galvanized steel complying with ASTM A1003/A1003M and/or ASTM A653/A653M G40 (Z120) or equivalent corrosion resistant coating. A40 galvanized products are not acceptable.
        - a) Coatings shall demonstrate equivalent corrosion resistance with evaluation report from approved testing agency.
    - b. Steel Studs and Runners: Cold-formed galvanized steel C-studs, as per ASTM C645 for conditions indicated.
    - c. Bridging, blocking, strapping, and other accessories shall be as described in Contract Documents or as required by Manufacturer's system.
    - d. Type One Acceptable Products:
      - 1) 362DS20P by CEMCO.
      - 2) ProSTUD 20 by ClarkDietrich Building Systems.
      - 3) 20 Ga 3-5/8 SS Series by Steeler Inc.
      - 4) Any member of Steel Framing Industry Association (SFIA).
      - 5) Any member of Steel Stud Manufacturer's Association (SSMA).
      - 6) Equal as approved by Architect before bidding. See Section 01 6200.
  - 2. Firestop Tracks:

- a. Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
3. Headers and Jambs - Heavy-Duty Stud:
  - a. Shape used to form header beams and jambs, columns or posts, of web depths indicated, unpunched, with stiffened flanges.
- C. Fasteners:
  1. Corrosion resistant coated, self-drilling, self-threading steel drill screws complying with ASTM C1513.

## 2.2 ACCESSORIES

- A. Sill Sealer: Closed-cell polyethylene foam, **1/4 inch (6 mm)** thick by width of plate.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Interface With Other Work:
  1. Coordinate with other Sections to provide blocking necessary for their work.
  2. Coordinate with other Sections for location of blocking required for installation of equipment and building specialties.
- B. Tolerances:
  1. **1/4 inch (6 mm)** in **20 feet (6 meters)**, non-cumulative in length of wall.
  2. **1/8 inch (3 mm)** in **10 feet (3 meters)** with **1/4 inch (6 mm)** maximum in height of wall.
  3. Distances between parallel walls shall be **1/4 inch (6 mm)** maximum along length and height of wall.
- C. Framing:
  1. Installation Standard: ASTM C754.
  2. Specifications of Stud Wall Manufacturer shall govern this work unless more stringent requirements are required by Contract Documents.
  3. Install specified sill sealer under sill plates of exterior walls and of acoustically insulated interior walls.
  4. Stiffen metal-framed walls with **3/4 inch (19 mm)** **1-1/2 inches (38 mm)** cold formed channels placed horizontally approximately **48 inch (1 200 mm)** on center and securely attach to each stud.
  5. Similarly reinforce door and window openings at headers with reinforcing channel extending **18 inches (450 mm)** minimum each side of opening.
  6. Apply double framing members at openings. Wrap multiple, adjacent framing members with duct tape or otherwise secure to eliminate 'chattering'.
  7. Use grommets at framing penetrations where unsecured items pass through.

**END OF SECTION**



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**SECTION 09 2226****METAL SUSPENSION SYSTEM: Gypsum Board****PART 1 - GENERAL****1.1 SUMMARY**

## A. Includes But Not Limited To:

1. Furnish and install metal suspension system for supporting gypsum drywall in typical ceiling and soffit areas and to support items penetrating ceiling as described in Contract Documents including:
  - a. Hanger wires, fasteners, main runners/tees, cross runners/tees, and wall molding/track.

## B. Related Requirements:

1. Section 09 2900: 'Gypsum Board'.
2. Section 09 5116: 'Acoustical Tile Ceilings'.
3. Section 26 5100: 'Interior Lighting' for electrical fixtures installed in ceiling.
4. Division 21: 'Fire Suppression' for sprinklers installed in ceiling.
5. Division 23: 'Mechanical' for related sections for HVAC installed in ceiling.
6. Division 26: 'Electrical' for related electrical work.
7. Division 27: 'Communications' for related sound and video work.

**1.2 REFERENCES**

## A. Association Publications:

1. The Ceilings & Interior Systems Construction Association (CISCA), 405 Illinois Avenue, 2B, St Charles IL. [www.cisca.org](http://www.cisca.org).
  - a. '*Ceiling Systems Handbook*': Recommendations for direct hung acoustical tile and lay-in panel ceiling installation.
  - b. CISCA 0-2, '*Guidelines for Seismic Restraint for Direct-hung Suspended Ceiling Assemblies (zones 0-2)*' Covers Seismic Design Category C.
  - c. CISCA 3-4, '*Guidelines for Seismic Restraint for Direct-hung Suspended Ceiling Assemblies (zones 3-4)*' Covers Seismic Design Category D, E, and F.
  - d. '*Production Guide*': Practical reference for ceiling systems and estimating costs.

## B. Definitions:

1. Ceiling Suspension System: System of metal members, designed to support a suspended ceiling. May accommodate lighting fixtures or air diffusers.
2. Clips: Designs to suit applications such as fire resistance, wind uplift and impact.
3. Compression Post (Vertical Strut, Seismic Struts): Rigid member used to provide lateral force bracing of suspension system.
4. Cross Runner, Cross Tee: Cross runner is secondary or cross beams of mechanical ceiling suspension system, usually supporting only acoustical tile. Cross tee is inserted into main runner to form different module sizes. In some suspension systems, however, cross runners also provide support for lighting fixtures, air diffusers and other cross runners.
5. Hanger Wires: Wire employed to suspend acoustical ceiling from existing structure. Standard material is **12 gauge (0.105 inch - 2.70 mm)** galvanized, soft annealed steel wire, conforming to ASTM A641/A641M. Heavier gauge wire is available for higher load carrying installations, or situations where hanger wire spacing exceeds **4 feet (1.20 m)** on center. Seismic designs or exterior installations subject to wind uplift may require supplemental bracing or substantial hanger devices such as metal straps, rods or structural angles.
6. Heavy-Duty Systems: Primarily used for installations in which the quantities and weights of ceiling fixtures (lights, air diffusers, etc.) are greater than those for ordinary commercial structure.

7. Main Beam, Main Runner, Main Tee: Primary or main beams of type of ceiling suspension system in which structural members are mechanically locked together. Provide direct support for cross runners and may support lighting fixtures and air diffusers, as well as acoustical tile. Supported by hanger wires attached directly to existing structure; or installed perpendicular to carrying channels and supported by specially designed sheet metal or wire clips attached to carrying channels.
8. Splay Wires: Wires installed at angle rather than perpendicular to grid.
9. Stiffening Brace: Used to prevent uplift of grid caused by wind pressure in exterior applications.

C. Reference Standards:

1. American Society of Civil Engineers/Structural Engineering Institute:
  - a. ASCE/SEI 7-10, 'Minimum Design Loads for Buildings and Other Structures'.
2. ASTM International:
  - a. ASTM A641/A641M-09a(2014), 'Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire'.
  - b. ASTM A653/A653M-18, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
  - c. ASTM A1008/A1008M-18, 'Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable'.
  - d. ASTM C635/C635M-17, 'Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings'.
  - e. ASTM C636/C636M-13, 'Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels'.
  - f. ASTM C645-18, 'Standard Specification for Nonstructural Steel Framing Members'.
  - g. ASTM C754-18, 'Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products'.
  - h. ASTM C841-03(2018), 'Standard Specification for Installation of Interior Lathing and Furring'.
  - i. ASTM D610-08(2012), 'Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces'.
  - j. ASTM E119-18, 'Standard Test Methods for Fire Tests of Building Construction and Materials'.
  - k. ASTM E580/E580M-17, 'Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions'.
3. International Building Code (IBC) (2018 or most recent edition adopted by AHJ):
  - a. IBC 808.1.1.1, 'Suspended Acoustical Ceiling'.
4. Underwriters Laboratories (UL):
  - a. UL 263: 'Standard for Fire Test of Building Construction and Materials' (14th Edition).
  - b. UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials' (11th Edition).

### 1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate layout of suspension system with other construction that penetrates ceilings or is supported by them, including drywall furring, light fixtures, HVAC equipment, and fire-suppression systems.
2. All work above ceiling should be completed prior to installing suspended system. There should be no materials resting against or wrapped around suspension system, hanger wires or ties.

### 1.4 SUBMITTALS

A. Action Submittals:

1. Product Data:
  - a. Provide Manufacturer's technical literature on suspension system including listing dimensions, load carrying capacity and standard compliance.
2. Samples:

- a. Minimum **8 inch (200 mm)** long samples of suspension system components, including main runner/tee and cross runner/tee with couplings.
- B. Informational Submittals:
1. Certificates:
    - a. Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.
    - b. Installer's certificates of training.
  2. Manufacturer's Instructions:
    - a. Seismic Design Categories D, E and F:
      - 1) Manufacturer's details and installation instructions for seismic bracing. If requested, provide copy of code requirements applicable to Project.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
1. All system components conform to ASTM standards.
  2. Fire-Resistance Rating: UL approved metal suspension system.
  3. Seismic Standard: Acoustical ceilings shall be designed and installed to withstand effects of earthquake motions according to following requirements:
    - a. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's *'Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings-Seismic Zones 0-2'* (Apply to Seismic Categories A & B).
    - b. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's *'Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies-Seismic Zones 3 & 4'* (Apply to Seismic Categories C, D, E & F).
    - c. Seismic Design Categories D, E and F:
      - 1) Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E580/E580M.
      - 2) Meet seismic bracing requirements of ASCE 7, ASTM C635/C635M and ASTM C636/C636M or equivalent governing standard for project site.
- B. Qualifications. Requirements of Section 01 4301 applies, but not limited to following:
1. Installer:
    - a. Installer training ('Ceiling Masters' training course or equivalent).
  2. Manufacturer:
    - a. Manufacturer in good standing of CISCA (Ceiling and Interior Systems Construction Association).

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
1. Materials shall be delivered in original, unopened packages with labels intact.
- B. Storage And Handling Requirements:
1. Materials shall be delivered in original, unopened packages with labels intact.
  2. Store material in fully enclosed space protected against damage from moisture, direct sunlight, surface contamination, and general damage.

## 1.7 WARRANTY

- A. Manufacturer Warranty:
1. Manufacturer standard ten (10) years warranty on suspension system including repair or replacement of rusting as defined by ASTM D610.

## PART 2 - PRODUCTS

### 2.1 SYSTEMS

#### A. Manufacturers:

1. Type One Acceptable Systems:
  - a. Drywall Grid by Armstrong World Industries, Lancaster, PA [www.armstrongceilings.com](http://www.armstrongceilings.com).
  - b. Drywall Grid System by Chicago Metallic Corporation, Chicago, IL [www.chicagometallic.com](http://www.chicagometallic.com).
  - c. Drywall Suspension System - Flat Ceilings by USG, Chicago, IL [www.usg.com](http://www.usg.com).
  - d. Equal as approved by Architect before bidding. See Section 01 6200.

#### B. Components:

1. Main Runners/Tee and Cross Runners/Tee:
  - a. Heavy-duty in accordance with ASTM C635/C635M.
  - b. Cold-formed from ASTM A653/A653M, CS Type B steel and hot dipped galvanized G-40 coating for interior ceilings.
  - c. Double-Web construction.
2. Wall Track/Molding.
3. Fasteners:
  - a. Nails are not permitted when subjected to direct tension such as installed vertically into bottom of structural member.
  - b. Metal attachment:
    - 1) Acoustical Eye Lag Screws:
      - a) **1/4 inch (6.4 mm)** screws zinc coated with self-drilling or self-piercing sharp point.
  - c. Wood attachment:
    - 1) Acoustical Eye Lag Screws:
      - a) **3 inch (76 mm) x 1/4 inch (6.4 mm)** screws zinc coated for wood joists with Type 17 self-drilling point.
  - d. Wire Tie to Metal Structural Member attachment:
    - 1) Wire wrapped to structural member with pigtail knot with three (3) tight wraps within **3 inch (76 mm)** length at top connection.
4. Hanger Wires, Braces, and Ties:
  - a. Zinc-Coated, carbon-steel wire meeting requirements of ASTM A641/A641M, Class 1 zinc coating, soft temper.
  - b. Size:
    - 1) Standard size: **12 gauge (0.105 inch) (2.70 mm)** galvanized, soft annealed steel wire.
    - 2) Select wire diameter so its stress is less than yield when loaded at three (3) times hanger design load (ASTM C635/C635M), Table 1, 'Direct Hung') will be less than yield stress of wire, but provide not less than **12 gauge (0.105 inch) (2.70 mm)**.
  - c. Protect with rust inhibitive paint.
5. Seismic Joint Clip:
  - a. Required for Seismic Design Categories D, E and F.
    - 1) Quality Standard Product:
      - a) SJCG by Armstrong.
      - b) Equal as approved by Architect before bidding. See Section 01 6200.
6. Compression Posts/Struts:
  - a. Required for Seismic Design Categories D, E and F.
    - 1) Meet seismic requirements for Project.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

#### A. Verification Of Conditions:

1. Inspect area receiving suspension system to identify conditions which will adversely affect installation.

- a. Work trades work to be thoroughly dry and complete prior to installation.
- b. Verify weather tightness of area to receive suspension system prior to installation.
2. Notify Architect of unsuitable conditions in writing.
  - a. Do not install suspension system until adverse conditions have been remedied.

### 3.2 INSTALLATION

#### A. Interface With Other Work:

1. All work above ceiling should be completed prior to installing suspended ceiling system including related work including: drywall furring work, acoustical tile, light fixtures, mechanical systems, electrical systems, and sprinklers.

#### B. General:

1. Install suspension system in accordance with Manufacturer's written instructions, and in compliance with ASTM installation standard, and applicable codes as required by AHJ with modifications listed below except where Manufacturer's instructions are more stringent:
  - a. Main runners/tees hanger wires **48 inches (1 200 mm)** on center maximum.
  - b. Cross runners/tees hanger wires **24 inches (600 mm)** on center maximum.
  - c. Do not kink, twist, or bend hanger wires as a means of leveling assembly.
2. Hanger Wires:
  - a. Install hanger wire to structure as required with necessary on center spacing to support expected ceiling load requirements, following local practices, codes and regulations. Attach with pigtail knot with three (3) tight wraps within **3 inch (76 mm)** length at each end.
  - b. Provide additional wires at light fixtures, grilles, and access doors where necessary by appropriate method in accordance with industry accepted practice.
  - c. Additional Hanger Wires: Wrapped tightly three (3) full turns within **3 inch (76 mm)** length to structure and component at locations where imposed loads could cause deflection exceeding 1/360 span.

#### C. Seismic:

1. Required for Seismic Design Categories D, E and F:
  - a. Installation must be in accordance with ASCE 7.

#### D. Tolerances:

1. Main Runners/Tees:
  - a. Installed and leveled to meet IBC requirements to within **1/4 inch (6.4 mm)** in **10 foot (3.05 m)** with supporting wire taut to prevent any subsequent downward movement of main runners when ceiling loads are imposed.
2. Cross Runners/Tees:
  - a. Main runners, or other cross runners, must support cross runners to within **1/32 inch (0.8 mm)** of required center-to-center spacing. This tolerance must be noncumulative beyond **12 feet (3.60 m)**.
  - b. Intersecting runners must be installed to form right angle to supporting members.

### 3.3 FIELD QUALITY CONTROL

#### A. Field Inspections:

1. Inspect:
  - a. Suspended ceiling system.
  - b. Hanger wires, braces, ties, anchors and fasteners.

#### B. Non-Conforming Work:

1. Remove and replace defective materials at no additional cost to Owner.

**END OF SECTION**

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**SECTION 09 2900****GYPSUM BOARD****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install gypsum board as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 2216: 'Non-Structural Metal Framing'.
  - 2. Section 09 9413: 'Interior Textured Finishing'.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Accessories: Metal or plastic beads, trim, or moulding used to protect or conceal corners, edges, or abutments of the gypsum board construction.
  - 2. Drywall Primer: Paint material specifically formulated to fill the pores and equalize the suction difference between gypsum board surface paper and the compound used on finished joints, angles, fastener heads, and accessories and over skim coatings.
  - 3. Skim Coat: Either a thin coat of joint compound trowel applied, or a material manufactured especially for this purpose and applied in accordance with manufacturer's recommendations, over the entire surface.
  - 4. Texturing: Regular or irregular patterns typically produced by applying a mixture of joint compound and water, or proprietary texture materials including latex base texture paint, to a gypsum board surface previously coated with drywall primer.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM C11-18, 'Standard Terminology Relating to Gypsum and Related Building Materials and Systems'.
    - b. ASTM C475/C475M-17, 'Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board'.
    - c. ASTM C840-18a, 'Standard Specification for Application and Finishing of Gypsum Board'.
    - d. ASTM C1002-18, 'Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs'.
    - e. ASTM C1047-14a, 'Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base'.
    - f. ASTM C1178/C1178M-18, 'Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel'.
    - g. ASTM C1396/C1396M-17, 'Standard Specification for Gypsum Board'.
    - h. ASTM E84-18b, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
    - i. ASTM E119-18b, 'Standard Test Method for Fire Tests of Building Construction and Materials'.
  - 2. Gypsum Association:
    - a. GA-214-15, 'Recommended Levels of Gypsum Board Finish'.
    - b. GA-216-16: 'Application and Finishing of Gypsum Panel Products'.
    - c. GA-600-15, 'Fire Reference Design Manual'.



- d. GA-801-2017, 'Handling and Storage of Gypsum Panel Products: A Guide for Distributors, Retailers, and Contractors'.
3. International Building Code (IBC) (2018 or latest approved version):
  - a. Chapter 25, 'Gypsum Board And Plaster'.
4. Standards Council of Canada / Underwriters Laboratories of Canada:
  - a. CAN/ULC-S102:2018: 'Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies'.
5. Underwriters Laboratories, Inc.
  - a. UL 263: 'Test Method for Fire Tests of Building Construction and Materials' (14th Edition).
  - b. UL 723: 'Test for Surface Burning Characteristics of Building Materials; (11th Edition).

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  1. Schedule MANDATORY pre-installation conference immediately before installation of gypsum wallboard.
  2. In addition to agenda items specified in Section 01 3100, review following:
    - a. Finish requirements necessary for installation of finish materials over gypsum wallboard, and location and installation of ceramic tile backerboard.

### 1.4 SUBMITTALS

- A. Informational Submittals:
  1. Test And Evaluation Reports:
    - a. Fire test results or assembly diagrams and numbers confirming products used will provide required fire ratings with installation configurations used.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. General:
  1. Following recommendations of GA-801 Guide for Handling and Storage of Gypsum Panel Products unless local, state or federal laws or agency rules differing from the recommendations shall take precedence.
- B. Delivery And Acceptance Requirements:
  1. Deliver materials in original packages, containers, or bundles bearing brand name, applicable standard designation, and Manufacturer's name.
- C. Storage And Handling Requirements:
  1. Store material under roof and keep dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack gypsum board flat to prevent sagging.

### 1.6 FIELD CONDITIONS

- A. Ambient Conditions:
  1. Comply with ASTM C840 or GA-216 requirements, whichever are more stringent:
    - a. Do not install interior products until installation areas are enclosed and conditioned.
      - 1) Temperature shall be 50 deg F (10 deg C) and 95 deg F (35 deg C) maximum day and night during entire joint operation and until execution of Certificate of Substantial Completion.
      - 2) Provide ventilation to eliminate excessive moisture.
      - 3) Avoid hot air drafts that will cause too rapid drying.

- b. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### A. Manufacturers:

1. Manufacturer Contact List:
  - a. American Gypsum, Dallas, TX [www.americangypsum.com](http://www.americangypsum.com).
  - b. CertainTeed Gypsum, Inc; Tampa, FL [www.certainteed.com](http://www.certainteed.com).
  - c. Georgia Pacific, Atlanta, GA [www.gp.com](http://www.gp.com).
  - d. National Gypsum, Charlotte, NC [www.nationalgypsum.com](http://www.nationalgypsum.com).
  - e. Pabco Gypsum, Newark, CA [www.pabcogypsum.com](http://www.pabcogypsum.com).
  - f. United States Gypsum Co, Chicago, IL [www.usg.com](http://www.usg.com).

#### B. Materials:

1. Interior Gypsum Board:
  - a. General:
    - 1) Size:
      - a) Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
    - 2) Class Two Quality Standard:
      - a) Core: Fire-resistant rated gypsum core.
      - b) Complies with Type X requirements of ASTM C1396/C1396M (Section 5).
      - c) Surface paper: Face paper suitable for painting.
      - d) Long edges: Tapered edge.
      - e) Overall thickness: **5/8 inch (15.9 mm)**.

### 2.2 ACCESSORIES

#### A. Manufacturers:

1. Manufacturer Contact List:
  - a. Kinetics Noise Control, Dublin, OH [www.kineticsnoise.com](http://www.kineticsnoise.com).
  - b. Magnum Products, Lenaxa, KS [www.levelcoat.com](http://www.levelcoat.com).
  - c. National Gypsum, Charlotte, NC [www.nationalgypsum.com](http://www.nationalgypsum.com).
  - d. Soundproofing Co, San Marcos, CA [www.soundproofing.org](http://www.soundproofing.org).
  - e. United States Gypsum Co, Chicago, IL [www.usg.com](http://www.usg.com).
  - f. Westpac Materials Inc, Orange, CA [www.westpacmaterials.com](http://www.westpacmaterials.com).
  - g. Wm. Zinsser & Co, Somerset, NJ [www.zinsser.com](http://www.zinsser.com).
2. Gypsum Board Mounting Accessories:
  - a. Furring Channels:
    - 1) Class Two Quality Standards. See Section 01 6200 for definitions:
      - a) Walls: Galvanized DWFC-25.
      - b) Ceilings: Galvanized DWFC-20.
    - 2) Accessories as required by Manufacturer's fire tests to provide necessary fire ratings.
  - b. Corner And Edge Trim:
    - 1) Metal, paper-faced metal, paper-faced plastic, or solid vinyl meeting requirements of ASTM C1047. Surfaces to receive bedding cement treated for maximum bonding.
  - c. Control Joint:
    - 1) Bent zinc sheet with V-shaped slot, perforated flanges, covered with plastic tape meeting requirements of ASTM C1047.
3. Joint Compound:
  - a. Best grade or type recommended by Board Manufacturer and meeting requirements of ASTM C475/C475M.

- 1) Use Taping Compound for first coat to embed tape and accessories.
  - 2) Use Taping Compound or All-Purpose Compound for subsequent coats except final coat.
  - 3) Use Finishing Compound for final coat and for skim coat.
4. Joint Reinforcing:
    - a. Paper reinforcing tape acceptable to Gypsum Board Manufacturer.
  5. Fasteners:
    - a. Bugle head screws meeting requirements of ASTM C1002:
      - 1) Gypsum Board:
        - a) Type W: For fastening gypsum board to wood members, of length to penetrate wood framing **5/8 inch (15.9 mm)** minimum.
        - b) Type S: For fastening gypsum board to steel framing and ceiling suspension members, of length to penetrate steel framing **3/8 inch (9.5 mm)** minimum.
- B. Primer / Surfer On Surfaces To Receive Texturing:
1. Type Two Acceptable Products:
    - a. Sheetrock First Coat by USG.
    - b. Prep Coat by Westpac Materials.
    - c. Level Coat by Magnum Products.
    - d. Equal as approved by Architect before bidding. See Section 01 6200.
- C. Primer On Surfaces To Receive Wallcovering:
1. White, self-sizing, water based, all purpose wallcovering primer.
  2. Type Two Acceptable Products:
    - a. Shieldz Universal Pre-Wallcovering Primer by Wm. Zinsser and Company.
    - b. Equal as approved by Architect before application. See Section 01 6200.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verification Of Conditions:
1. Examine substrate and verify framing is suitable for installation of gypsum board.
  2. Examine gypsum board before installation. Reject panels that are wet, moisture damaged, and mold damaged.
  3. Notify Architect of unsuitable conditions in writing.
    - a. Do not install board over unsuitable conditions.
  4. Commencement of Work by installer is considered acceptance of substrate.

### **3.2 INSTALLATION**

- A. Interface With Other Work:
1. Coordinate with Division 06 for location of backblocking for edges and ends of gypsum board and for blocking required for installation of equipment and building specialties.
  2. Do not install gypsum board until required blocking is in place.
- B. General: Install and finish as recommended in ASTM C840 or GA-216 unless specified otherwise in this Section.
- C. Mounting Accessories:
1. Furring Channels: Apply with screws through flanges into each framing member.
- D. Interior Gypsum Board:
1. General:

- a. Install so trim and reinforcing tape are fully backed by gypsum board. No hollow spaces between pieces of gypsum board over **1/8 inch (3 mm)** wide before taping are acceptable.
  - b. Rout out backside of gypsum board to accommodate items that extend beyond face of framing, but do not penetrate face of gypsum board, such as metal door frame mounting brackets, etc.
  - c. On walls over **108 inches (2 700 mm)** high, apply board perpendicular to support
  - d. Butt edges in moderate contact. Do not force in place. Shim to level.
  - e. Leave facings true with joint, finishing flush. Vertical work shall be plumb and ceiling surfaces level.
  - f. Scribe work closely:
    - 1) Keep joints as far from openings as possible.
    - 2) If joints occur near an opening, apply board so vertical joints are centered over openings.
    - 3) No vertical joints shall occur within **8 inches (200 mm)** of external corners or openings.
  - g. Install board tight against support with joints even and true. Tighten loose screws.
  - h. Caulk perimeter joints in sound insulated rooms with specified acoustical sealant.
2. Ceilings:
- a. Apply ceilings first using minimum of two (2) men.
  - b. Use board of length to give minimum number of joints.
  - c. Apply board perpendicular to support.
3. Fastening:
- a. Apply from center of board towards ends and edges.
  - b. Apply screws **3/8 inch (9.5 mm)** minimum from ends and edges, **one inch (25 mm)** maximum from edges, and **1/2 inch (13 mm)** maximum from ends.
  - c. Spacing:
    - 1) Ends: Screws not over **7 inches (175 mm)** on center at edges where blocking or framing occurs.
    - 2) Wood Framed Walls And Ceilings: Screws **7 inches (175 mm)** on center in panel field.
    - 3) Metal Framed Walls: Screws **12 inches (300 mm)** on center in panel field.
  - d. Set screw heads **1/32 inch (0.8 mm)** below plane of board, but do not break face paper. If face is accidentally broken, apply additional screw **2 inches (50 mm)** away.
  - e. Screws on adjacent ends or edges shall be opposite each other.
  - f. Drive screws with shank perpendicular to face of board
4. Trim:
- a. Corner Beads:
    - 1) Attach corner beads to outside corners.
      - a) Attach metal corner bead with staples spaced **4 inches (100 mm)** on center maximum and flat taped over edges of corner bead. Also, apply screw through edge of corner bead where wood trim will overlay corner bead.
      - b) Set paper-faced trim in solid bed of taping compound.
  - b. Edge Trim: Apply where gypsum board abuts dissimilar material. Hold channel and 'L' trim back from exterior window and door frames **1/8 inch (3 mm)** to allow for caulking.
5. Finishing:
- a. General:
    - 1) Tape and finish joints and corners throughout building as specified below to correspond with final finish material to be applied to gypsum board. When sanding, do not raise nap of gypsum board face paper or paper-faced trim.
    - 2) First Coat:
      - a) Apply tape over center of joint in complete, uniform bed of specified taping compound and wipe with a joint knife leaving a thin coating of joint compound. If metal corner bead is used, apply reinforcing tape over flange of metal corner bead and trim so half of tape width is on flange and half is on gypsum board.
      - b) Completely fill gouges, dents, and fastener dimples.
      - c) Allow to dry and sand lightly if necessary, to eliminate high spots or excessive compound.
    - 3) Second Coat:

- a) Apply coat of specified joint compound over embedded tape extending **3-1/2 inches (88 mm)** on both sides of joint center. Use finishing compound only if applied coat is intended as final coat.
- b) Re-coat gouges, dents, and fastener dimples.
- c) Allow to dry and sand lightly to eliminate high spots or excessive compound.
- 4) Third Coat: Apply same as second coat except extend application **6 inches (150 mm)** on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
- 5) Fourth Coat: Apply same as second coat except extend application **9 inches (425 mm)** on both sides of joint center. Allow to dry and sand with fine sandpaper or wipe with damp sponge.
- a. Finishing Levels: Finish panels to levels indicated below and according to ASTM C840, GA-214 and GA-216:
  - 1) Gypsum Board Surfaces not painted or finished and Under Acoustical Tile:
    - a) GA-214 Level 2: 'All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the conditions of this level.
    - b) Note: It is critical that gypsum board ceiling be smooth before installing ceiling tile. Drywall joints must be as specified in paragraph above.
  - 2) Gypsum Board Surfaces to Receive: Wall Covering Type A - Section 09 7226: 'Sisal Wall Covering':
    - a) GA-214 Level 3: 'All joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all joints and interior angles. Fastener heads and accessories shall be covered with two separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified wall covering primer'.
  - 3) Gypsum Board Surfaces to Receive: Painted Texturing - Section 09 9413: 'Interior Textured Finishing':
    - a) GA-214 Level 4: 'All and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified primer'.
  - 4) Gypsum Board Surfaces to Receive: Smooth Gypsum Board Surfaces:
    - a) GA-214 Level 4: 'All and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges. Coat prepared surface with specified primer'.
  - 5) Painted, Untextured Gypsum Board Surfaces, Except in Mechanical, Storage, And Utility Areas:
    - a) GA-214 Level 5: 'All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. A thin skim coat of joint compound trowel applied, or a material manufactured especially for this purpose and applied in accordance with manufacturer's recommendations, shall be applied to the entire surface. The surface shall be smooth and free of tool marks and ridges. Coat prepared surface with specified primer'.

### **3.3 FIELD QUALITY CONTROL**

A. Non-Conforming Work:

1. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  - a. Indications that panels are wet, or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

### **3.4 CLEANING**

- A. Remove from site debris resulting from work of this Section including taping compound spills.

**END OF SECTION**

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**SECTION 09 5116****ACOUSTICAL TILE CEILINGS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
1. Furnish and install acoustical tile on backerboard as described in Contract Documents.
- B. Related Requirements:
1. Section 09 2226: 'Metal Suspension System' for Gypsum Board.
  2. Section 09 2900: 'Gypsum Board'.
  3. Section 09 5116: 'Interior Lighting'.

**1.2 REFERENCES**

- A. Association Publications:
1. The Ceilings & Interior Systems Construction Association (CISCA), 405 Illinois Avenue, 2B, St Charles IL. [www.cisca.org](http://www.cisca.org).
    - a. '*Ceiling Systems Handbook*': Recommendations for direct hung acoustical tile installation.
    - b. '*Production Guide*': Practical reference for ceiling systems and estimating costs.
- B. Definitions:
1. Absorption: Materials that have capacity to absorb sound. Absorption is the opposite of reflection.
  2. Ceiling Attenuation Class (CAC): Rates ceiling's efficiency as barrier to airborne sound transmission between adjacent closed offices. Shown as minimum value, previously expressed as CSTC (Ceiling Sound Transmission Class). Single-figure rating derived from normalized ceiling attenuation values in accordance with classification ASTM E413, except that resultant rating shall be designated ceiling attenuation class. (Defined in ASTM E1414.) Acoustical unit with high CAC may have low NRC.
  3. Class A: Fire classification for product with flame spread rating of no more than 25 and smoke developed rating not exceeding 50, when tested in accordance with ASTM E84 or UL 723.
  4. Flame Spread: The propagation of flame over a surface.
  5. Flame Spread Index: Comparative measure, expressed as a dimensionless number, derived from visual measurements of the spread of flame versus time for a material tested in accordance with ASTM E84 or UL 723.
  6. Light Reflectance (LR): Percentage of light a surface reflected by ceiling surface expressed in decimal form.
  7. Noise Reduction Coefficient (NRC): Average sound absorption coefficient measured at four frequencies: 250, 500, 1,000 and 2,000 Hertz expressed to the nearest integral multiple of 0.05. Rates ability of ceiling or wall panel or other construction to absorb sound. NRC is fraction of sound energy, averaged over all angles of direction and from low to high sound frequencies that is absorbed and not reflected.
  8. Smoke-Developed Index: Comparative measure, expressed as a dimensionless number, derived from visual measurements of smoke obscuration versus time for a material tested in accordance with ASTM E84 or UL 723.
  9. Sound Absorption: Property possessed by materials and objects, including air, of converting sound energy into heat energy. Sound wave reflected by surface always loses part of its energy. Fraction of energy that is not reflected is called sound absorption coefficient of reflecting surface. For instance, if material reflects 80 percent of sound energy, then sound absorption coefficient would be 20 percent (0.20).



10. Surface Burning Characteristic: Rating of interior and surface finish material providing indexes for flame spread and smoke developed, based on testing conducted according to ASTM Standard E84 or UL 723.
11. Textured Pattern: Granular or raised (fine, coarse, or a blend), felted or matted surface as an integral part of the basic product or superimposed on the product surface.

C. Reference Standards:

1. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRA):
  - a. ASHRAE Standard 62.1-2013, 'Ventilation for Acceptable Indoor Air Quality'.
2. ASTM International;
  - a. ASTM D1779-98(2017), 'Standard Specification for Adhesive for Acoustical Materials'.
  - b. ASTM E84-18b, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - c. ASTM E795-16, 'Standard Practices for Mounting Test Specimens During Sound Absorption Tests'.
  - d. ASTM E1264-14, 'Standard Classification for Acoustical Ceiling Products'.
  - e. ASTM E1414/E1414-16, 'Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum'.
  - f. ASTM E1477 - 98a(2017), 'Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers'.
3. International Building Code (IBC) (2018 or latest approved Edition):
  - a. Chapter 8, 'Interior Finishes':
    - 1) Section 803, 'Wall And Ceiling Finishes':
      - a) 803.1.1, 'Interior Wall and Ceiling Finish Materials'.
      - b) 803.1.2, 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
4. National Fire Protection Association:
  - a. NFPA 101: 'Life Safety Code' (2018 Edition).
  - b. NFPA 265: 'Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls' (2015 Edition).
5. Underwriters Laboratories Inc.:
  - a. UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials' (Tenth Edition).

### 1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:

1. Participate in pre-installation conference specified in Section 09 2900 to review finish requirements for gypsum wallboard ceilings.
2. Schedule acoustical tile ceiling pre-installation conference after installation of gypsum wallboard but before beginning installation of tile.
3. In addition to items specified in Section 01 3100, review following:
  - a. Verify that tile comes from same dye lot and has same dye lot code.
  - b. Review requirements of acceptable and non-acceptable tile.

### 1.4 SUBMITTALS

A. Action Submittals:

1. Samples:
  - a. One (1) sample of each variant of specified tile series.

B. Informational Submittals:

1. Certificates:
  - a. Installer(s):
    - 1) Provide each Installer's 'Certificate of Completion - Duratile' from Manufacture showing Name and completion date with bid to be included in closing documents for project.
      - a) Certificate is valid for two (2) years from date printed on Certificate before recertification is required.

2. Test And Evaluation Reports:
    - a. If requested by Owner, provide copies of Quality Assurance requirements for 'Class A' flame spread rating and 'Room-Corner Test'.
  3. Manufacturer Installations:
    - a. Published installation recommendations.
  4. Qualification Statement:
    - a. Installer(s):
      - 1) Provide Qualification documentation unless waived by Owner.
- C. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Include final, executed copy of warranty.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Manufacturer's literature on tile and adhesive.
        - b) Color and pattern selection.
      - 2) Installer(s) 'Certificate of Completion - Duratile' submitted at time of bid.
- D. Maintenance Material Submittals:
1. Extra Stock Materials:
    - a. Provide Owner with six (6) cartons of each type of tile with same dye lot code.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
1. Fire-Test-Response Characteristics: As determined by testing identical ceiling tile applied with identical adhesives to substrates according to test method indicated below by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Surface-Burning Characteristics:
      - 1) Ceiling tile shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
        - a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
        - b) Flash point: None.
  2. Passage of 'Room-Corner Test' as recognized by AHJ, is required for system. Adhesive cited in test literature is required for installation of ceiling tile on Project.
    - a. Room Corner Tests:
      - 1) ASTM E84, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
      - 2) IBC 803.2.1, 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
      - 3) NFPA 265: 'Room Corner Test for Interior Wall or Ceiling Finish Materials'.
      - 4) UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'.
- B. Qualifications:
1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
    - a. Minimum five (5) years satisfactorily completed projects of comparable quality, similar size, and complexity including a minimum of three (3) years of experience in glue-up ceiling tile installations and shall have satisfactorily completed glue-up installation(s) within in past three (3) years before bidding.
    - b. Review, understand, and comply Installer Qualifications and submitted 'Duratile' published installation recommendations provided by Manufacturer:
      - 1) Contact Armstrong CSA customer service center at (800) 442-4212 to obtain and review compliance package on Duratile prior to bidding.
      - 2) This requirement may be waived by Owner, if Installer has previously complied with Installer Qualification requirements and can document at least two (2) satisfactorily completed projects of comparable size using Armstrong 12 inch x 12 inch (300 mm x 300 mm) ceiling tile for glue-up within past three (3) years prior to bidding.

- 3) Installer shall note complete compliance with Qualification requirements on submitted bid form.
- 4) Submit qualification documentation unless waived by Owner.
- c. Agree to complete and pass 'Duratile Personal Learning Module' (Certificate required for all Installer(s) for Church projects). Certification valid for two (2) years:
  - 1) Go to <http://www.armstrong.com/commceilingsna/#>.
  - 2) Click on My Armstrong Upper Right hand Corner.
  - 3) First time users: Click on 'Register' button and provide all appropriate information for username and password (you must register as a contractor to have access to 'ELearning System).
  - 4) Under My Armstrong Functions (left hand side), click on 'ELearning System'.
  - 5) Click on 'Duratile Video'.
  - 6) Watch video and take Quiz (10 questions). Passing grade required for certificate.
  - 7) Print Certificate.
  - 8) Certificate must be submitted with Bid.
  - 9) Submit 'Certificate of Completion - Duratile'. Required for all projects and may not be waived by Owner.

## 1.6 DELIVERY, STORAGE, AND HANDLING

### A. Delivery and Acceptance Requirements:

1. Materials shall be delivered in original, unopened packages with labels intact.

### B. Storage And Handling Requirements:

1. Store materials where protected from moisture, direct sunlight, surface contamination, and damage.
2. Store acoustic tile in cool, dry location, out of direct sunlight and weather, and at temperatures between **32 deg F (0 deg C)** and **86 deg F (30 deg C)**.
3. Store adhesive on site at installation temperature, between **65 and 90 deg F (18 and 32 deg C)**, for one week before installation.
4. Handle acoustical ceiling tiles carefully to avoid chipping edges or damage. Use no soiled, scratched, or broken material in the Work.

## 1.7 FIELD CONDITIONS

### A. Ambient Conditions:

1. Building shall be enclosed, mechanical system operating with proper filters in place, and temperature and humidity conditions stabilized within limits under which Project will operate before, during, and after installation until Substantial Completion.
2. Temperature at time of setting tile shall be **50 deg F (10 deg C)** minimum and **100 deg F (38 deg C)** maximum.

## 1.8 WARRANTY

### A. Manufacturer Warranty:

1. Provide Manufacturer's ten (10) year limited system warranty for the following:
  - a. Manufacturer's warranty to be free from defects in materials and factory workmanship.
  - b. Manufacturer's warranty against sagging and warping.
  - c. Manufacturer's warranty against mold/mildew, and bacterial growth.

**PART 2 - PRODUCTS****2.1 SYSTEM****A. Manufacturers:****1. Manufacturer Contact List:**

- a. Armstrong World Industries, Strategic Accounts, Lancaster, PA [www.ceiling.com](http://www.ceiling.com).
  - 1) For pricing and ordering of tile, contact Sherry Brunt, Phyllis Miller, or Beth Rinehart at (800) 442-4212, or [Armstrongcsa@armstrong.com](mailto:Armstrongcsa@armstrong.com).
  - 2) For Strategic Account information, contact Deborah Pickens at (480) 695-9053 [dlpickens@armstrong.com](mailto:dlpickens@armstrong.com).
- b. Franklin International, Inc., Columbus, OH [www.titebond.com](http://www.titebond.com).

**B. Materials:****1. Description:**

- a. Size: **3/4 inch (19 mm)** thick minimum by **12 inches (300 mm)** square.
- b. Color: White.
- c. Grid Face: Tile glue-up.
- d. Surface Finish: Factory-applied.
- e. Wet-formed high density mineral fiber.

**2. Design Criteria:**

- a. Meet requirements of ASTM E1264, Type III (mineral base with painted finish), Form 2 (water felted), Pattern CE (perforated, small holes – lightly textured), Fire Class A.
- b. Acoustics:
  - 1) Noise Reduction Coefficient (Rating expressed according to ASTM E1284 requirements:
    - a) NRC rating: 60 minimum.
    - 2) CAC rating: 35 minimum.
- c. Anti Mold / Mildew:
  - 1) Resistance against growth of mold/mildew.
- d. Durable:
  - 1) Impact-resistant.
  - 2) Scratch-resistant.
- e. Tongue and Groove.
- f. Finish:
  - 1) Abuse-resistant/durable, factory applied vinyl latex paint.
- g. Fire Performance:
  - 1) Panels meet ASTM E84 or UL 723 Type 1 surface burning characteristics.
- h. High Recycled Content (HRC): Classified as containing greater than 50 percent total recycled content.
- i. Light Reflectance (LR): 0.86 Average (Range of 0.84 to 0.88).
- j. Sag Resistance:
  - 1) Resistance to sagging in high humidity conditions up to, but not including, standing water and outdoor applications.
- k. Texture: Embossed texture with fine fissuring and small perforations with natural variation in texture and color appearance between tile.
- l. VOC Emissions:
  - 1) Low formaldehyde: Contributing less than 13.5 ppb in typical conditions per ASHRAE Standard 62, 'Ventilation for Acceptable Indoor Air Quality'.

**3. Acoustic Tile:**

- a. Category Three Approved Products. See Section 01 6200 for definitions of Categories:
  - 1) Duratile Item No. MN80377 by Armstrong.

**C. Accessories:****1. Adhesive:**

- a. Description:
  - 1) For use on acoustical ceiling tiles.
- b. Design Criteria:
  - 1) Meet requirements of ASTM D1779.

- 2) Meet NFPA Class A fire rating when tested in accordance with ASTM E84.
- 3) Fast grab and 'no sag' installation.
- 4) Water cleanup.
- 5) Not recommended for use on tiles larger than 12 inch x 12 inch (305 mm x 305 mm).
- c. Type Two Acceptable Products:
  - 1) Titebond No. 2704 Solvent Free Acoustical Ceiling Tile Adhesive by Franklin International.
  - 2) Highest quality of adhesive from manufacturer recommended by Tile Manufacturer as approved by Architect before use. See Section 01 6200.
2. Edge Molding:
  - a. Steel 'U' molding with baked enamel finish.
  - b. Type Two Acceptable Products:
    - 1) 7843 Series by Armstrong.
    - 2) Equal as approved by Architect before installation. See Section 01 6200.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
  1. Inspect for defects in backing and support that are not acceptable.
    - a. Examine areas around HVAC diffusers and light fixtures for tile installation problems.
    - b. Examine ceiling for levelness. CISCA 'Code of Practice' requires ceiling to be free of irregularities and be level to within 1/4 inch (6 mm) in 12 foot (305 mm).
    - c. Examine substrate for any problems that will compromise adhesion of ceiling tile.
  2. Notify Architect in writing of unacceptable conditions.
  3. Do not apply ceiling tile until defects in backing and support are corrected.

### 3.2 PREPARATION

- A. Surface Preparation:
  1. Follow Manufacturer recommendations for surface preparation:
    - a. Substrate must be clean, free of grease and dirt, sound, smooth, even and level before applying tile to surface.
      - 1) Do not install new ceiling tile over old glue globs or bad substrate with any surface finish that is incompatible with tile adhesive.
    - b. Painted Surfaces: Avoid applying tile to newly painted ceiling.
    - c. Materials shall be dry and clean at time of application.

### 3.3 INSTALLATION

- A. Special Techniques:
  1. Installation shall be in accordance with Manufacturer's recommendations:
    - a. Do not install tile when room temperature exceeds or below recommended ambient conditions.
    - b. Tile is directional tile and must be installed in same direction of pattern running parallel to long dimension of each room.
    - c. Remove loose dust from back of tile and ceiling where adhesive is to be applied.
    - d. Prime 3 inch (75 mm) minimum circle near each corner by buttering very thin coat of adhesive.
    - e. Apply daub of adhesive to each corner. Daubs will be of sufficient size to form a circle 2-1/2 to 3 inches (63 to 75 mm) in diameter and 1/8 to 1/4 inch (3 to 6 mm) thick when tile is pressed firmly in place. Do not apply daubs so far in advance of installation that adhesive skins over.
    - f. Do not bend tile during installation.

2. Tile Layout:
  - a. Lay out tile symmetrically about center lines of room.
  - b. Lay out so tiles at room perimeters are at least 1/2 full tile size.
  - c. Leave tile in true plane with straight, even joints.
  - d. Tile joints shall be straight and in alignment, and exposed surface flush and level.
  - e. Furnish and install specified molding wherever tile has exposed edges or abuts walls, columns, and other vertical surfaces, except at curves of 3 inch (75 mm) radius or smaller.
  - f. Cut around penetrations that are not to receive moldings cleanly with sharp knife and at a slight angle away from cutout.
3. Ceiling mounted items:
  - a. Locate light fixtures, speakers, and mechanical diffusers and grilles symmetrically in room and centered on tile centers or tile joints insofar as possible, unless shown otherwise.
  - b. Keep method of locating ceiling mounted items as consistent as possible throughout building.
  - c. Ceiling mounted item location method within each room shall always be consistent.

### 3.4 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
  1. Acoustical Tile. The following have been identified by the Manufacturer as tile defects, should not be installed, and will be replaced at no charge to Owner. Manufacturer will replace any material that does not meet product specifications. Installer to call 1 (800) 442-4212 immediately to report any tile discrepancies:
    - a. Obvious Tile Defects:
      - 1) Gross surface defects or damage.
      - 2) Gross damage to edges and corners.
      - 3) Bevels without paint.
    - b. Size Measurement:
      - 1) Tiles measure 12 inches (305 mm), plus or minus 1/32 inch (0.8 mm), measured across center of two (2) parallel sides.
    - c. Squareness Measurement:
      - 1) Measure two (2) diagonals of an individual ceiling tile.
      - 2) Diagonal measurements need to be within 1/16 inch (1.6 mm) of each other. No more than 1/16 inch (1.6 mm) difference.
    - d. Warp:
      - 1) Tiles specification is plus or minus 0.050 inch (1.27 mm) as measured in the center of tile.
  2. Installer:
    - a. Substrate preparation and installation of ceiling tile not following CISCA Code of Practice will be unacceptable and considered defective and subject to replacement at no cost to Owner.

### 3.5 ADJUSTING

- A. 'Touch-up' minor abraded surfaces.

### 3.6 CLEANING

- A. Remove from site debris connected with work of this Section.

**END OF SECTION**

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**SECTION 09 7226****SISAL WALL COVERING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnishing and installing wall covering 'Type A' (Sisal) as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 06 4512: 'Architectural Woodwork Wood Trim' for wood trim for sisal wall covering.
  - 2. Section 09 2900: 'Gypsum Board' for priming of gypsum board.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Class A: Fire classification for product with flame spread rating of no more than 25 and smoke developed rating not exceeding 50, when tested in accordance with ASTM E84 or UL 723.
    - a. Flame Spread: The propagation of flame over a surface.
    - b. Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.
    - c. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.
    - d. Surface Burning Characteristic: Rating of interior and surface finish material providing indexes for flame spread and smoke developed, based on testing conducted according to ASTM Standard E84 or UL 723.
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM E84-18, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - 2. International Building Code (IBC) (2015 or latest approved edition):
    - a. Chapter 8, 'Interior Finishes':
      - 1) Section 803, 'Wall And Ceiling Finishes':
        - a) 803.1.3, 'Room Corner Test for Textile Wall Coverings and Expanded Vinyl Wall Coverings'.
        - b) 803.1.4, 'Acceptance Criteria for Textile and Expanded Vinyl Wall Coverings Tested to ASTM E84 or UL 723'.
  - 3. National Fire Protection Association:
    - a. NFPA 101: 'Life Safety Code' (2015 Edition).
    - b. NFPA 265: 'Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls', (2015 Edition).
  - 4. Underwriters Laboratories, Inc.:
    - a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (2010 - Tenth Edition).

**1.3 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's literature or cut sheet.
    - b. Maintenance instructions.



- c. Color and pattern selection.
- B. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. Copies of Quality Assurance requirements for 'Class A' flame spread rating and 'Room-Corner Test'.
  - 2. Qualification Statement:
    - a. Installer:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Cleaning and maintenance instructions.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Manufacturer's literature or cut sheets.
        - b) Color and pattern selections.

#### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Surface-Burning Characteristics:
      - 1) Wall covering shall have Class A flame spread rating in accordance with ASTM E84 or UL 723 Type 1.
        - a) Class A (Flame spread index 0-25; Smoke-developed index 0-450).
        - b) Flash point: None.
  - 2. Passage of 'Room-Corner Test' as recognized by AHJ, is required for system. Adhesive cited in test literature is required for installation of wall covering on Project.
    - a. Room Corner Tests:
      - 1) ASTM E84, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
      - 2) IBC 803.1.3, 'Room Corner Test for Textile Wall Coverings and Expanded Vinyl Wall Coverings'.
      - 3) IBC 803.1.4, 'Acceptance Criteria for Textile and Expanded Vinyl Wall Coverings Tested to ASTM E84 or UL 723'.
      - 4) NFPA 265, 'Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls'.
      - 5) UL 723, 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'.
- B. Qualifications:
  - 1. Installer: Requirements of Section 01 4301 applies, but not limited to following:
    - a. Minimum three (3) years experience in wall covering installations.
    - b. Minimum five (5) years satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
    - c. Agree to view 'No-Flame Sisal Wall Covering Recommended Installation Procedures' provided by Owner found on internet in AEC Webpage under Training in Menu tab. Contact Architect for access to video. This requirement may be waived by Owner, if Installer has viewed video before or can document at least two (2) satisfactorily completed projects of comparable size using sisal wall coverings in past three (3) years before bidding.
    - d. Upon request, submit documentation and video verification.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  - 1. Deliver materials in sealed containers with Manufacturer's labels intact.
- B. Storage And Handling Requirements:
  - 1. Store materials in protected area at temperatures below 90 deg F (32 deg C) and above 50 deg F (10 deg C). Keep from freezing.
  - 2. Keep container tightly closed in well-ventilated area, and store upright when not in use.
  - 3. Shelf life: One (1) year minimum - Unopened containers.

## 1.6 FIELD CONDITIONS

- A. Ambient Conditions:
  - 1. Apply when the temperature is between 50 deg F (10 deg C) minimum and 100 deg F (38 deg C) maximum and relative humidity is less than seventy-five (75) percent.
  - 2. Provide good ventilation.

## 1.7 WARRANTY

- A. Manufacturer Warranty:
  - 1. Provide five (5) year warranty against manufacturing defects.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturer Contact List:
  - 1. Design Materials Inc, Kansas City, KS [www.dmikc.com](http://www.dmikc.com).
  - 2. Fibreworks, Louisville, KY [www.fibreworks.com](http://www.fibreworks.com).

### 2.2 DESCRIPTION

- A. Colors:
  - 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Design Materials: Color: Match existing sisal on project.
    - b. Fibreworks: Color: Match existing sisal on project.

### 2.3 MATERIALS

- A. Sisal Wall Covering:
  - 1. 100 percent fire-treated sisal yarn.
  - 2. 1/4 inch (6 mm) pile height, 48 oz/sq yd (1 627 grams/sq meter) minimum. Sisal to be installed full height on walls shall be furnished in 9 or 13 foot (2.75 or 3.96 meters) wide goods.
  - 3. Reversible weave type, without backing.

### 2.4 ACCESSORIES

- A. Wall Covering Adhesive:
  - 1. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
    - a. 257 Sisal Adhesive by Fibreworks.
    - b. Sisal Adhesive No. 1-422 by Design Materials.

- B. Seam Cement:
  - 1. Type Two Acceptable Products:
    - a. 8415 Glue-Down Carpet Seam Adhesive by Roberts Consolidated Industries, Div QEP, Henderson, NV [www.robertsconsolidated.com](http://www.robertsconsolidated.com).
    - b. Equal as recommended by Wall Covering Manufacturer with approval of Architect before installation. See Section 01 6200.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLERS**

- A. Acceptable Installers:
  - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

#### **3.2 EXAMINATION**

- A. Verification Of Conditions:
  - 1. Examine substrate and verify that it is suitable for installation of sisal wall covering.
  - 2. Notify Architect of unsuitable conditions in writing.
    - a. Do not install over unsuitable conditions.
  - 3. Commencement of Work by installer is considered acceptance of substrate.

#### **3.3 INSTALLATION**

- A. Apply wall covering in accordance with Manufacturer's instructions, available on DVD from Owner through Architect. See Quality Assurance Installer Qualifications as specified in Part 1 of this specification.
- B. Using specified adhesive, glue continuously to surface to be covered with wall covering. Apply adhesive in accordance with Manufacturer's recommendations.
- C. Run 'ribs' in weaving horizontally (panel style) when installing wall covering full height. If sisal installed only as wainscoting, 'ribs' may be installed vertically. Install wall covering so it extends to within **1/8 inch (3 mm)** of floor slab.
- D. Carry sisal around corners approximately **6 inch (152 mm)** making no outside corner cuts.
- E. Apply wall covering in one piece on walls adjacent to stairs leading to Platform to avoid unsightly and challenging seams.

**END OF SECTION**

**SECTION 09 9001**

**COMMON PAINTING AND COATING REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Common procedures and requirements for field-applied painting and coating.
- B. Related Requirements:
  - 1. Section 05 0503: 'Shop-Applied Metal Coatings' for quality of shop priming of steel and iron.
  - 2. Section 07 9213: 'Elastomeric Joint Sealants' for quality of Elastomeric Joint Sealants.
  - 3. Section 09 0162: 'Finishing New Or Sanded Wood Athletic Flooring' for finishing of hardwood flooring and painting of game lines.
  - 4. Sections under 09 9000 heading 'Paints and Coatings'.
    - a. Pre-Installation conferences held jointly with Section 09 9001.
  - 5. Divisions 22 and 23: Painting of plumbing and HVAC identification, refrigerant line insulation, and duct interiors.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Damage Caused By Others: Damage caused by individuals other than those under direct control of Painting Applicator (MPI(a), PDCA P1.92).
  - 2. Gloss Levels:
    - a. Specified paint gloss level shall be defined as sheen rating of applied paint, in accordance with following terms and values, unless specified otherwise for a specific paint system.

Gloss Level '1'	Traditional matte finish - flat	0 to 5 units at 60 degrees to 10 units maximum at 85 degrees.
Gloss Level '2'	High side sheen flat - 'velvet-like' finish	10 units maximum at 60 degrees and 10 to 35 units at 85 degrees.
Gloss Level '3'	Traditional 'eggshell-like' finish	10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
Gloss Level '4'	'Satin-like' finish	20 to 35 units at 60 degrees and 35 units minimum at 85 degrees.
Gloss Level '5'	Traditional semi-gloss	35 to 70 units at 60 degrees.
Gloss Level '6'	Traditional gloss	70 to 85 units at 60 degrees.
Gloss Level '7'	High gloss	More than 85 units at 60 degrees.

- 3. Properly Painted Surface:
  - a. Surface that is uniform in appearance, color, and sheen and free of foreign material, lumps, skins, runs, sags, holidays, misses, strike-through, and insufficient coverage. Surface free of drips, spatters, spills, and overspray caused by Paint Applicator. Compliance will be determined when viewed without magnification at a distance of **5 feet (1.50 m)** minimum under normal lighting conditions and from normal viewing position (MPI(a), PDCA P1.92).
- 4. Latent Damage: Damage or conditions beyond control of Painting Applicator caused by conditions not apparent at time of initial painting or coating work.

- B. Reference Standards:

1. The latest edition of the following reference standard shall govern all painting work:
  - a. MPI(a), 'Architectural Painting Specification Manual' by Master Painters Institute (MPI), as issued by local MPI Accredited Quality Assurance Association having jurisdiction.
  - b. MPI(r), 'Maintenance Repainting Manual' by Master Painters Institute (MPI), as issued by local MPI Accredited Quality Assurance Association having jurisdiction.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conferences:
  1. Schedule painting pre-installation conference after delivery of paint or coatings and before or at same time as application of field samples.
    - a. Coordinate pre-installation conferences of all related painting and coating Sections under 09 9000 heading 'Paints and Coatings'.
    - b. Schedule conference before preparation of control samples as specified in Sections under 09 9000 heading 'Paints and Coatings'.
    - c. Conference to be held at same time as Section 09 2900 to review gypsum board finish preparation.
  2. In addition to agenda items specified in Section 01 3100, review following:
    - a. Review Quality Assurance for Approval requirements.
    - b. Review Quality Assurance Field Sample requirements.
    - c. Review Submittal requirements for compliance for MPI Approved Products.
    - d. Review Design Criteria requirements.
    - e. Review Cleaning requirements.
    - f. Review painting schedule.
    - g. Review safety issues.
  3. Review additional agenda items from Sections under 09 9000 heading 'Paints and Coatings'.

### 1.4 SUBMITTALS

- A. Action Submittals:
  1. Product Data:
    - a. Include following information for each painting product, arranged in same order as in Project Manual.
      - 1) Manufacturer's cut sheet for each product indicating ingredients and percentages by weight and by volume, environmental restrictions for application, and film thicknesses and spread rates.
      - 2) Provide one (1) copy of 'MPI Approved Products List' showing compliance for each MPI product specified.
        - a) MPI Information is available from MPI Approved Products List using the following link: <http://www.paintinfo.com/mpi/approved/index.shtml>.
      - 3) Confirmation of colors selected and that each area to be painted or coated has color selected for it.
  2. Samples: Provide two 4 inch by 6 inch (100 mm by 150 mm) minimum draw-down cards for each paint or coating color selected for this Project.
- B. Informational Submittals:
  1. Manufacturer Instructions:
    - a. Manufacturer's substrate preparation instructions and application instruction for each painting system used on Project.
  2. Qualification Statement:
    - a. Applicator:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
  1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Record Documentation:
      - 1) Manufacturer's documentation:

- a) Manufacturer's cut sheet for each component of each system.
  - b) Schedule showing rooms and surfaces where each system was used.
- D. Maintenance Materials Submittals:
1. Extra Stock Materials:
    - a. Provide painting materials in Manufacturer's original containers and with original labels in each color used. Label each can with color name, mixture instructions, date, and anticipated shelf life.
    - b. Provide one (1) quart of each finish coat and one (1) pint of each primer and of each undercoat in each color used.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approval:
1. Conform to work place safety regulations and requirements of those authorities having jurisdiction for storage, mixing, application and disposal of all paint and related hazardous materials.
  2. Paint and painting materials shall be free of lead and mercury, and have VOC levels acceptable to local jurisdiction.
  3. Master Painters Institute (MPI) Standards:
    - a. Products: Comply with MPI standards indicated and listed in 'MPI Approved Products List'.
    - b. Preparation and Workmanship: Comply with requirements in 'MPI Architectural Painting Specification Manual' for products and coatings indicated.
- B. Qualifications:
1. Applicator: Requirements of Section 01 4301 applies, but not limited to following:
    - a. Minimum five (5) years' experience in painting installations.
    - b. Minimum five (5) satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
    - c. Maintain qualified crew of painters throughout duration of the Work.
    - d. Upon request, submit documentation.
- C. Field Samples:
1. Before application of any paint system, meet on Project site with Architect, Owner's representative, and Manufacturer's representative. Architect may select one (1) surface for application of each paint system specified. This process will include establishing acceptable substrate conditions required for Project before application of paints and coatings.
  2. Apply paint systems to surfaces indicated by Architect following procedures outlined in Contract Documents and Product Data submission specified above.
  3. After approval of samples, proceed with application of paint system throughout Project. Approved samples will serve as standard of acceptability.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
1. Deliver specified products in sealed, original containers with Manufacturer's original labels intact on each container.
  2. Deliver amount of materials necessary to meet Project requirements in single shipment.
  3. Notify Architect two working days before delivery of coatings.
- B. Storage And Handling Requirements:
1. Store materials in single place.
  2. Keep storage area clean and rectify any damage to area at completion of work of this Section.
  3. Maintain storage area at 55 deg F (13 deg C) minimum.

## 1.7 FIELD CONDITIONS

### A. Ambient Conditions:

1. Perform painting operations at temperature and humidity conditions recommended by Manufacturer for each operation and for each product for both interior and exterior work.
2. Apply painting systems at lighting level of 540 Lux (50 foot candles) minimum on surfaces to be painted.
  - a. Inspection of painting work shall take place under same lighting conditions as application.
  - b. If painting and coating work is applied under temporary lighting, deficiencies discovered upon installation of permanent lighting will be considered latent damage as defined in MPI Manual, PDCA P1-92.

## PART 2 - PRODUCTS

### 2.1 SYSTEMS

#### A. Performance:

##### 1. Design Criteria:

- a. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
- b. All materials, preparation and workmanship shall conform to requirements of 'Architectural Painting Specification Manual' by Master Painters Institute (MPI).
- c. All paint manufacturers and products used shall be as listed under Approved Product List section of MPI Painting Manual.
- d. Provide Premium Grade systems (2 top coats) as defined in MPI Architectural Painting Specification Manual, except as otherwise indicated.
- e. Where specified paint system does not have Premium Grade, provide Budget Grade.
- f. Provide products of same manufacturer for each coat in coating system.
- g. Where required to meet LEED (Leadership in Energy and Environmental Design) program requirements, use only MPI listed materials having an "L" rating designation.
- h. Color Levels:
  - 1) Color Level II:
    - a) Number and placement of interior and exterior paint colors and gloss levels shall be as defined by Color Level II from MPI Manual, PDCA P3-93 as modified in following paragraph.
    - b) No more than one paint color or gloss level will be selected for same substrate within designated interior rooms or exterior areas.
  - 2) Color Level III:
    - a) Number and placement of interior and exterior paint colors and gloss levels shall be Color Level III from MPI Manual, PDCA P3-93 as modified in following paragraph.
    - b) Several paint colors or gloss levels will be selected for same substrate within designated interior rooms or exterior areas.

#### B. Materials:

1. Materials used for any painting system shall be from single manufacturer unless approved otherwise in writing by painting system manufacturers and by Architect. Include manufacturer approvals in Product Data submittal.
2. Linseed oil, shellac, turpentine, and other painting materials shall be pure, be compatible with other coating materials, bear identifying labels on containers, and be of highest quality of an approved manufacturer listed in MPI manuals. Tinting color shall be best grade of type recommended by Manufacturer of paint or stain used on Project.

## **PART 3 - EXECUTION**

### **3.1 APPLICATORS**

- A. Approved Applicators:
1. Meet Quality Assurance Applicator Qualifications as specified in Part 1 of this specification.

### **3.2 EXAMINATION**

- A. Verification Of Conditions:
1. Directing applicator to begin painting and coating work will indicate that substrates to receive painting and coating materials have been previously inspected as part of work of other Sections and are complete and ready for application of painting and coating systems as specified in those Sections.
- B. Pre-Installation Testing:
1. Before beginning work of this Section, examine, and test surfaces to be painted or coated for adhesion of painting and coating systems.
  2. Report in writing to Architect of conditions that will adversely affect adhesion of painting and coating work.
  3. Do not apply painting and coating systems until party responsible for adverse condition has corrected adverse condition.
- C. Evaluation And Assessment:
1. Report defects in substrates that become apparent after application of primer or first finish coat to Architect in writing and do not proceed with further work on defective substrate until such defects are corrected by party responsible for defect.

### **3.3 PREPARATION**

- A. Protection Of In-Place Conditions:
1. Protect other finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following:
    - a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.
    - b. Keep cones of ceiling speakers completely free of paint. In all cases where painting of metal speaker grilles is required, paint without grilles mounted to speakers and without grilles on ceiling.
    - c. On existing work where ceiling is to be painted, speakers and grilles are already installed, and ceiling color is not being changed, mask off metal grilles installed on ceiling speakers. If ceiling color is being changed, remove metal grilles and paint, and mask off ceiling speakers.
- B. Surface Preparation:
1. Prepare surfaces in accordance with MPI requirements and requirements of Manufacturer for each painting system specified, unless instructed differently in Contract Documents. Bring conflicts to attention of Architect in writing.
  2. Fill minor holes and cracks in wood surfaces to receive paint or stain.
  3. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.
  4. Do no exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting. Moisture content of materials to be painted shall be within tolerances acceptable to Paint Manufacturer.
  5. Sand woodwork smooth in direction of grain leaving no sanding marks. Clean surfaces before proceeding with stain or first coat application.



### 3.4 APPLICATION

- A. Interface With Other Work:
  - 1. Coordinate with other trades for materials and systems that require painting before installation.
  - 2. Schedule painting and coating work to begin when work upon which painting and coating work is dependent has been completed. Schedule installation of pre-finished and non-painted items, which are to be installed on painted surfaces, after application of final finishes.
- B. Paint or finish complete all surfaces to be painted or coated as described in Contract Documents, including but not limited to following items.
  - 1. Paint mechanical, electrical, and audio/visual items that require field painting as indicated in Contract Documents. These include but are not limited to:
    - a. Gas pipe from gas meter into building.
    - b. Mechanical flues and pipes penetrating roof.
    - c. Electrical panel and disconnect enclosures.
    - d. Metal protective structures for refrigerant lines.
  - 2. Metal reveals at ceiling access doors.
  - 3. Paint inside of chases in occupied spaces flat black for 18 inches (450 mm) or beyond sightline, whichever is greater.
  - 4. Paint surfaces behind speaker grilles incorporating grille cloth with flat black paint.
- C. Apply sealant in gaps 3/16 inch (5 mm) and smaller between two substrates that are both to be painted or coated. Sealants in other gaps furnished and installed under Section 07 9213.
- D. On wood to receive a transparent finish, putty nail holes in wood after application of stain using natural colored type to match wood stain color. Bring putty flush with adjoining surfaces.
- E. In multiple coat paint work, tint each succeeding coat with slightly lighter color, but approximating shade of final coat, so it is possible to check application of specified number of coats. Tint final coat to required color.
- F. Spread materials smoothly and evenly. Apply coats to not less than wet and dry film thicknesses and at spreading rates for specified products as recommended by Manufacturer.
- G. Touch up suction spots after application of first finish coat.
- H. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.
- I. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.
- J. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.
- K. Finished work shall be a 'Properly Painted Surface' as defined in this Section.

### 3.5 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
  - 1. Correct deficiencies in workmanship as required to leave surfaces in conformance with 'Properly Painted Surface,' as defined in this Section.
  - 2. Correction of 'Latent Damage' and 'Damage Caused By Others,' as defined in this Section, is not included in work of this Section.

### 3.6 CLEANING

- A. General:
  - 1. As work proceeds and upon completion of work of any painting Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition.

B. Waste Management:

1. Remove rags and waste used in painting operations from building each night. Take every precaution to avoid danger of fire.
2. Paint, stain and wood preservative finishes and related materials (thinners, solvents, caulking, empty paint cans, cleaning rags, etc.) shall be disposed of subject to regulations of applicable authorities having jurisdiction.
3. Remove debris caused by work of paint Sections from premises and properly dispose.
4. Retain cleaning water and filter out and properly dispose of sediments.

**END OF SECTION**

## **ATTACHMENTS**

### **PART 4 - PAINT COLOR SCHEDULE**

- A. Related Requirements:
  - 1. Section 09 9121 'Interior Painted Poured Concrete'.
  - 2. Section 09 9123 'Interior Painted Gypsum Board-Plaster'.
  - 3. Section 09 9124 'Interior Painted Metal'.
  - 4. Section 09 9125 'Interior Wood Paint'.
  - 5. Section 09 9324 'Interior Clear-Finished Hardwood'.
  
- B. Colors: Match existing colors at existing building.

**SECTION 09 9123****INTERIOR PAINTED GYPSUM BOARD, PLASTER****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Preparing, priming, and finish painting new interior gypsum board and plaster surfaces as described in Contract Documents.
  - 2. Preparing and painting following existing interior gypsum board and plaster surfaces as described in Contract Documents:
    - a. Paint existing surfaces and walls effected by renovation and as described in the contract documents.
- B. Related Requirements:
  - 1. Section 09 2900: 'Gypsum Board' for:
    - a. Priming new interior gypsum board surfaces to receive sheet wall covering system or texturing.
    - b. Pre-installation conference.
  - 2. Section 09 9001: 'Common Painting And Coating Requirements':
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
    - b. 'Attachment: Paint Color Schedule' for O&M / R&I Projects.
  - 3. Section 09 9413: 'Interior Textured Finishing' for textured finishes.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 2900.
    - a. In addition to agenda items specified in Section 01 3100 and Section 09 2900, review following:
      - 1) Review finish level requirements of gypsum wallboard as specified in Section 09 2900.
  - 2. Participate in pre-installation conference as specified in Section 09 9001.

**PART 2 - PRODUCTS****2.1 SYSTEM**

- A. Manufacturers:
  - 1. Category Four Approved Manufacturers and Products. See Section 01 6200 for definitions of Categories.
    - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
  - 1. All Other:
    - a. New Surfaces: Use MPI(a) INT 9.2B Latex Finish system.
    - b. Previously Finished Work: Use MPI(r) RIN 9.2B Latex Finish system.
- C. Performance:

1. Design Criteria:
  - a. New Surfaces: MPI Premium Grade finish requirements.
  - b. Deteriorated Existing Surfaces: MPI Premium Grade finish requirements.
  - c. Sound Existing Surfaces: MPI Custom Grade requirements.
  - d. Gloss / Sheen Required:
    - 1) Remaining Painted Surfaces: Match Gloss Level of adjacent surface.
- D. Materials:
  1. Primers:
    - a. MPI Product 50, 'Primer Sealer, Latex, Interior'.
  2. Finish Coats:
    - a. Remaining Painted Surfaces:
      - 1) MPI Product 141, 'Latex, Interior, High Performance Architectural, Semi-Gloss (MPI Gloss Level 5)'. Match Gloss Level of adjacent surfaces.

## **PART 3 - EXECUTION**

### **3.1 APPLICATION**

- A. General: See appropriate paragraphs of Section 09 9001.
- B. New Surfaces:
  1. Primer: Apply primer to be covered with other paint coats with roller only, or with spray gun and back-rolled.
- C. Existing Painted Surfaces:
  1. Remove deteriorated existing paint down to sound substrate by scraping or sanding. Feather edges of existing paint by sanding to be smooth with adjacent surfaces.
  2. Clean surface with mild soap and water, or with tri-sodium phosphate (TSP). Wash surfaces that have been defaced with marking pens, crayons, lipstick, etc, with solvent recommended by Paint Manufacturer. Spot prime such surfaces.
  3. Spackle and tape cracks. Sand to smooth finish and spot prime.
  4. Sand or chemically etch existing painted surface as required to prepare surface to accept new paint.
  5. Re-clean surface.
  6. Apply primer coat.
  7. Apply finish coats.

**END OF SECTION**

**SECTION 09 9124****INTERIOR PAINTED METAL****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Preparing and painting new interior metal surfaces as described in Contract Documents.
  - 2. Preparing and painting following existing interior metal surfaces as described in Contract Documents:
    - a. Paint existing surfaces effected by renovation and as described in the contract documents.
- B. Related Requirements:
  - 1. Section 05 5871: 'Metal Brackets'.
  - 2. Section 09 9001: 'Common Painting And Coating Requirements':
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
    - b. 'Attachment: Paint Color Schedule' for O&M / R&I Projects.
  - 3. Section 23 0553: 'I. D. For HVAC Piping And Equipment' for field painting requirements of HVAC piping and equipment.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 9001.
- B. Sequencing:
  - 1. Paint brackets furnished under Section 05 5871 before installation of bracket.

**PART 2 - PRODUCTS****2.1 SYSTEM**

- A. Manufacturers:
  - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories.
    - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
  - 1. Ferrous Metal:
    - a. New Surfaces: Use MPI(a) INT 5.1B Waterborne Light Industrial Finish system.
    - b. Previously Finished Surfaces: Use MPI(r) RIN 5.1B Waterborne Light Industrial Finish system.
  - 2. Galvanized Metal:
    - a. New Surfaces: Use MPI(a) INT 5.3J Latex Finish system
    - b. Previously Finished Surfaces: Use MPI(r) RIN 5.3AH Latex Finish system.
  - 3. Aluminum:
    - a. New Surfaces: Use MPI(a) INT 5.4E Waterborne Light Industrial Finish system.
    - b. Previously Finished Surfaces: Use MPI(r) REX 5.4E Light Industrial Finish system.
- C. Performance:

1. Design Requirements:
  - a. New Surfaces: MPI Premium Grade finish requirements.
  - b. Deteriorated Existing Surfaces: MPI Premium Grade finish requirements.
  - c. Sound Existing Surfaces: MPI Custom Grade finish requirements.
  - d. Gloss / Sheen Level Required: Gloss Level 5.
  
- D. Materials:
  1. Primers:
    - a. Ferrous Metal: MPI Product 107, 'Primer, Rust-Inhibitive, Water Based'.
    - b. Galvanized Metal: MPI Product 134: 'Primer, Galvanized, Water Based'.
    - c. Aluminum: MPI Product 95: 'Primer, Quick Dry, for Aluminum'.
  2. Finish Coats: MPI Product 153: 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.

## **PART 3 - EXECUTION**

### **3.1 APPLICATION**

- A. General:
  1. See appropriate paragraphs of Section 09 9001.
  2. Systems specified are in addition to prime coats furnished under other Sections.
  
- B. New Surfaces: Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.
  
- C. Existing Painted Surfaces:
  1. Remove deteriorated existing paint down to sound substrate by scraping and sanding. Feather edges of existing paint by sanding to be smooth with adjacent surfaces. Spot prime bare metal surfaces immediately.
  2. Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.
  3. Clean existing sound painted surfaces as well as scraped and sanded existing painted surfaces as recommended by Paint Manufacturer.
  4. Apply prime coat over entire surface to be painted.
  5. Lightly sand entire surface.
  6. Clean surface as recommended by Paint Manufacturer.
  7. Apply finish coats.

**END OF SECTION**

**SECTION 09 9125****INTERIOR PAINTED WOOD****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Preparing and painting new woodwork and wood floors not requiring transparent finish, as described in Contract Documents.
  - 2. Preparing and painting following existing woodwork surfaces not requiring transparent finish, as described in Contract Documents:
    - a. Paint existing surfaces effected by renovation and as described in the contract documents.
- B. Related Requirements:
  - 1. Section 09 9001: 'Common Painting And Coating Requirements':
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
    - b. 'Attachment: Paint Color Schedule' for O&M / R&I Projects.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 9001.

**PART 2 - PRODUCTS****2.1 SYSTEM**

- A. Manufacturers:
  - 1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
- B. Description:
  - 1. Systems:
    - a. Floors:
      - 1) New Surfaces: Use MPI(a) INT 6.5H Waterborne Epoxy Finish system.
      - 2) Previously Finished Surfaces: Use MPI(r) RIN 6.5K Latex Finish system.
    - b. All Other:
      - 1) New Surfaces: Use MPI(a) INT 6.3T or U Latex Finish system.
      - 2) Previously Finished Surfaces: MPI(r) Rin 6.3U Latex Finish system.
- C. Performance:
  - 1. Design Criteria:
    - a. New Surfaces: MPI Premium Grade finish requirements.
    - b. Deteriorated Existing Surfaces: MPI Premium Grade finish requirements.
    - c. Sound Existing Surfaces: MPI Custom Grade finish requirements.
    - d. Gloss / Sheen Level Required: Gloss Level 5.
- D. Materials:
  - 1. Wood Floors:



- a. Low to medium traffic: MPI Product 60, 'Floor Paint, Latex, Low Gloss'.
2. Woodwork:
  - a. Primer Coat: MPI Product 39, 'Primer, Latex, for Interior Wood' or MPI Product 45, 'Primer Sealer, Alkyd, Interior'.
  - b. Finish Coats: MPI Product 153, 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.

### **PART 3 - EXECUTION**

#### **3.1 APPLICATION**

- A. General: See appropriate paragraphs of Section 09 9001.
- B. Interface With Other Work:
  1. Properly clean and paint light cove interiors before installation of light fixtures.
  2. Where back-priming is required, apply one (1) coat of primer.
- C. New Surfaces:
  1. Spot prime nail holes, cracks, and blemishes before and after puttying.
  2. Apply stain blocker or other product recommended by Paint Manufacturer to knots before applying primer coat.
- D. Existing Painted Surfaces:
  1. Remove deteriorated existing paint down to sound substrate by scraping and sanding. Feather edges of existing paint by sanding to be smooth with adjacent surfaces. Spot prime bare wood areas on woodwork.
  2. Wash surfaces that have been defaced with marking pens, crayons, lipstick, etc, with solvent recommended by Paint Manufacturer. Spot prime such surfaces.
  3. Apply finish coats.

**END OF SECTION**

**SECTION 09 9324****INTERIOR CLEAR-FINISHED HARDWOOD****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Preparing and finishing of new interior clear finished hardwood as described in Contract Documents.
  - 2. Preparing and painting following existing woodwork surfaces requiring transparent finish, as described in Contract Documents:
    - a. Existing Hardwood trim, base and chair rail that is being re-used as described in the contract documents.
  
- B. Related Requirements:
  - 1. Section 06 2210: 'Miscellaneous Wood Trim'.
  - 2. Section 06 4512: 'Architectural Woodwork Wood Trim'.
  - 3. Section 08 1429: 'Interior Flush Wood Doors'.
  - 4. Section 09 9001: 'Common Painting And Coating Requirements':
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
    - b. 'Attachment': Paint Color Schedule' for O&M / R&I Projects.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. Kitchen Cabinet Manufacturers Association / American National Standards Institute:
    - a. ANSI/KCMA A161.1-2000 (R2005) 23-Jan-2001 'Recommended Performance and Construction Standards for Kitchen and Vanity Cabinets.'

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 9001.
  - 2. In addition to agenda items specified in Section 01 3100 and Section 09 9001, review following:
    - a. Review control sample(s).

**1.4 SUBMITTALS**

- A. Action Submittals:
  - 1. Samples:
    - a. Interior Hardwood for Transparent Finish:
      - 1) Requirements for samples are specified in Related Requirement Sections listed above.
    - b. Design Criteria:
      - 1) Sample will be used as performance standard for evaluating finish provided.
  
- B. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. Before beginning finish work, submit Finish Manufacturer's literature or certification that finish material meets requirements of ANSI / KCMA A161.1.

## PART 2 - PRODUCTS

### 2.1 SYSTEM

- A. Materials:
1. Design Criteria:
    - a. See appropriate paragraphs of Section 09 9001.
  2. Stain: MPI 90, 'Stain, Semi-Transparent, for Interior Wood'.
  3. Clear Finish Coats:
    - a. Field Finished:
      - 1) Chemcraft International Inc:
        - a) First, Second, And Third Coats: 20 Sheen Opticlear Pre-Catalyzed Lacquer.
      - 2) ICI Dulux / Trinity:
        - a) First Coat: ICE Vinyl Sanding Sealer.
        - b) Second And Third Coats: ICI Pre-Catalyzed Lacquer.
      - 3) Lilly / Valspar:
        - a) First, Second, And Third Coats: 20 Sheen Pre-Catalyzed Lacquer 587E208.
      - 4) Sherwin-Williams:
        - a) First Coat: T67F3 Vinyl Sealer.
        - b) Second And Third Coats: T77F38 Sherwood Pre-Catalyzed Lacquer DRE.
    - b. Mill Finished: Architectural Woodwork finished in a mill may use one (1) coat of Vinyl Sealer and two (2) coats of Conversion Varnish or three (3) coats of Conversion Varnish from one (1) of the approved Finish Manufacturers, as recommended by Finish Manufacturer.
    - c. Products meeting testing requirements for finishes of ANSI / KCMA A161.1 may be used upon approval of submission by Architect before use. See Section 01 6200.
  4. Color:
    - a. Design Criteria:
      - 1) Finish to match Owner selected sample.
      - 2) Performance standard: Match stain and finish of existing Birch wood.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. General:
1. See appropriate paragraphs of Section 09 9001.
  2. Sand entire exposed surface of item to be finished lightly with 120 to 150 non-stearated sandpaper and clean before applying dye or stain.
  3. Apply stain in accordance with Manufacturer's recommendations and as necessary to attain correct color.
  4. Scuff sand with 220 non-stearated sandpaper between application of application stain and first finish coat.
  5. If wood is finished before installation, finish cut ends and other unfinished, exposed surfaces same as previously finished surfaces after installation of wood.
- B. Where back-priming is required, apply one coat of finish material.
- C. Architectural Woodwork Door Surfaces (cabinetry doors only):
1. Finish tops, bottoms, and edges before faces.
  2. Finish architectural woodwork doors with no hardware applied to doors.

**END OF SECTION**

**SECTION 09 9413****INTERIOR TEXTURED FINISHING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and apply texturing on walls and ceilings as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 2900: 'Gypsum Board' for priming.
  - 2. Section 09 9001: 'Common Painting And Coating Requirements' for:
    - a. Pre-installation conference for Sections under 09 9000 heading 'Paints and Coatings'.
  - 3. Section 09 9123: 'Interior Painted Gypsum Board, Plaster' for finish painting.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Drywall Texture: Compound rolled, sprayed, or troweled onto sheetrock after taping and floating of joints is complete. Uses same material as joint compound, but thinned down with water and applied to wall surface:
    - a. Light Orange Peel: Sprayed texture leaves light splatter on walls. Resembles peel of orange. If done with fine spray, can be one of the lightest, least noticeable of the texture styles.
    - b. Light Skip Trowel - Texture is applied to ceilings with trowel. Trowel marks may be left on surface to give a rustic, hand crafted look.
    - c. Hawk and Trowel, Multi-Directional: Lightly sanded, (80/20) 80 percent smooth with 20 percent random voids. Resembles aged plaster.
    - d. Smooth - Smooth application of texture over sheetrock wall that feathers out sheetrock joints, and creates even, non-textured wall.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conferences:
  - 1. Participate in pre-installation conference as specified in Section 09 9001.
  - 2. In addition to agenda items specified in Section 01 3100 and Section 09 9001, review following:
    - a. Review control samples.

**1.4 SUBMITTALS**

- A. Action Submittals:
  - 1. Samples:
    - a. Light Orange Peel Texture:
      - 1) Provide minimum of three (3) 24 inch (600 mm) square control samples on primed gypsum wallboard of 'light orange peel' texture to show possible variations.
    - b. Light Skip Trowel Texture:
      - 1) Provide minimum of three (3) 24 inch (600 mm) square control samples on primed gypsum wallboard of 'light orange peel' texture to show possible variations.
  - 2. Samples:
    - a. Hawk and Trowel, Multi-Directional (lightly sanded) Texture:

- 1) Provide minimum of three (3) **24 inch (600 mm)** square control samples on primed gypsum wallboard of 'multi-directional' texture (70/30, 80/20, and 90/10) to show possible variations.

## 1.5 QUALITY ASSURANCE

- A. Field Samples:
  1. Before performing work of this Section, prepare control samples.
  2. Architect will inspect control sample at pre-installation conference following preparation of control sample. When sample is approved, work of this Section may proceed. Approved samples will be kept at site at all times work of this section is being performed.

## PART 2 - PRODUCTS

### 2.1 SYSTEM

- A. Manufacturers:
  1. Manufacturer Contact List:
    - a. National Gypsum, Charlotte, NC [www.nationalgypsum.com](http://www.nationalgypsum.com).
    - b. U S Gypsum Co, Chicago, IL [www.usg.com](http://www.usg.com).
- B. Materials:
  1. Class Two Quality Standards: See Section 01 6200.
    - a. ProForm Perfect Spray EM/HF by National Gypsum.
    - b. Sheetrock Wall & Ceiling Texture by U S Gypsum.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. This is an existing building and has multiple textures. Match texture of adjacent surface from one of the following:
  1. Walls:
    - a. Light Orange Peel Texture:
      - 1) Where adjacent wall surface is Orange Peel Texture.
    - b. Smooth:
      - 1) Where adjacent wall surface is Smooth Texture.
    - c. Hawk And Trowel, Multi-Directional (lightly sanded) Texture:
      - 1) Where adjacent wall surface is Hawk And Trowel, Multi-Directional (lightly sanded) Texture.
  2. Ceilings:
    - a. Light Orange Peel Texture:
      - 1) Where adjacent ceiling surface is Orange Peel Texture.
    - b. Light Skip Trowel Texture:
      - 1) Where adjacent ceiling surface is Light Skip Trowel Texture.
    - c. Smooth Finish (no applied texture) to be applied to the following ceilings:
      - 1) Where adjacent ceiling surface is Smooth Texture.
    - d. Hawk And Trowel, Multi-Directional (lightly sanded) Texture:
      - 1) Where adjacent ceiling surface is Hawk And Trowel, Multi-Directional (lightly sanded) Texture.
- B. Finishing:
  1. Light Orange Peel Texture:

- a. After gypsum board is taped and sanded, apply texture. Closely match samples accepted by Architect.
  - 1) After wall has been textured, apply priming and finish paint as specified in Section 09 9123.
2. Skip Trowel Texture:
  - a. After gypsum board is taped and sanded, apply texture. Closely match samples accepted by Architect.
    - 1) After wall has been textured, apply priming and paint as specified in Section 09 9123.
3. Smooth:
  - a. No applied texture is required. Apply priming and paint as specified in Section 09 9123.
4. Hawk And Trowel, Multi-Directional (lightly sanded) Texture:
  - a. After gypsum board is taped and sanded, apply texture. Closely match samples accepted by Architect.
    - 1) After wall has been textured, apply priming and finish paint as specified in Section 09 9123.

**END OF SECTION**

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## **DIVISION 10: SPECIALTIES**

### **10 1000 INFORMATION SPECIALTIES**

10 1495 MISCELLANEOUS INTERIOR SIGNAGE

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**SECTION 10 1495**

**MISCELLANEOUS INTERIOR SIGNAGE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install interior signs as described in Contract Documents.

**1.2 SUBMITTALS**

- A. Action Submittals:
  - 1. Shop Drawings: Schedule showing signs required, location, and text.
  - 2. Samples: Provide sample sign for comparison with existing signs.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURED UNITS**

- A. Signs:
  - 1. Type Two Acceptable Products:
    - a. Provide required signs matching existing in color, lettering style, size, etc, as approved by Architect before installation. See Section 01 6200.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Install signs square and plumb. Match mounting method and location of existing signs.

**END OF SECTION**

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## **DIVISION 22: PLUMBING**

### **22 0500 COMMON WORK RESULTS FOR PLUMBING**

- 22 0501 COMMON PLUMBING REQUIREMENTS
- 22 0529 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

### **22 1000 PLUMBING PIPES AND PUMPS**

- 22 1313 FACILITY SANITARY SEWERS
- 22 1319 FACILITY SANITARY SEWER SPECIALTIES

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**SECTION 22 0501****COMMON PLUMBING REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Common requirements and procedures for plumbing systems.
  - 2. Responsibility for proper operation of electrically powered equipment furnished under this Division.
  - 3. Furnish and install sealants relating to installation of systems installed under this Division.
  - 4. Furnish and install Firestop Penetration Systems for plumbing systems penetrations as described in Contract Documents.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Sleeves, inserts, supports, and equipment for plumbing systems installed under other Sections.
- C. Related Requirements:
  - 1. Section 07 8400: 'Firestopping' for quality of penetration firestop systems to be used on Project and submittal requirements.
  - 2. Section 07 9213: 'Elastomeric Joint Sealant' for quality at building exterior.
  - 3. Sections Under 09 9000 Heading: 'Paints And Coatings' for painting of plumbing items requiring field painting.
  - 4. Division 26: 'Electrical' for raceway and conduit, unless specified otherwise, and line voltage wiring.
  - 5. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.

**1.2 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's catalog data for each manufactured item.
      - 1) Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
      - 2) Include name, address, and phone number of each supplier.
- B. Informational Submittals:
  - 1. Qualification Statement:
    - a. Plumbing Subcontractor:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
    - b. Installer:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data (Modify and add to requirements of Section 01 7800):
      - 1) At beginning of PLUMBING section of Operations And Maintenance Manual, provide master index showing items included:

- a) Provide name, address, and phone number of Architect, Architect's Mechanical Engineer, General Contractor, and Plumbing subcontractor.
  - b) Identify maintenance instructions by using same equipment identification used in Contract Drawings. Maintenance instructions shall include:
    - (1) List of plumbing equipment used indicating name, model, serial number, and nameplate data of each item together with number and name associated with each system item.
    - (2) Manufacturer's maintenance instructions for each piece of plumbing equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance instructions.
  - c) Provide operating instructions to include:
    - (1) General description of fire protection system.
    - (2) Step by step procedure to follow for shutting down system or putting system into operation.
- b. Warranty Documentation:
- 1) Include copies of warranties required in individual Sections of Division 22.

### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
1. Perform work in accordance with applicable provisions of Plumbing Codes applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
  2. In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing work affected by such differences.
  3. Identification:
    - a. Motor and equipment name plates as well as applicable UL / ULC and AGA / CGA labels shall be in place when Project is turned over to Owner.
- B. Qualifications. Requirements of Section 01 4301 applies, but not limited to following:
1. Plumbing Subcontractor:
    - a. Company specializing in performing work of this section.
      - 1) Minimum five (5) years experience in plumbing installations.
      - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
    - b. Upon request, submit documentation.
  2. Installer:
    - a. Licensed for area of Project.
    - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
    - c. Upon request, submit documentation.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
1. Accept valves on site in shipping containers with labeling in place.
  2. Provide temporary protective coating on cast iron and steel valves.
  3. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- B. Storage And Handling Requirements:
1. In addition to requirements specified in Division 01, stored material shall be readily accessible for inspection by Architect until installed.
  2. Store items subject to moisture damage in dry, heated spaces.



## 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Provide certificates of warranty for each piece of equipment made out in favor of Owner.
- B. Special Warranty:
  - 1. Guarantee plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
  - 2. If plumbing sub-contractor with offices located more than 150 miles (240 km) from Project site is used, provide service / warranty work agreement for warranty period with local plumbing sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

## PART 2 - PRODUCTS

### 2.1 COMPONENTS

- A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.
- B. Pipe And Pipe Fittings:
  - 1. Weld-O-Let and Screw-O-Let fittings are acceptable.
- C. Sleeves:
  - 1. General:
    - a. Two sizes larger than bare pipe or insulation on insulated pipe.
  - 2. In Concrete And Masonry:
    - a. Sleeves through outside walls, interior shear walls, and footings shall be schedule 80 black steel pipe with welded plate.
  - 3. In Framing And Suspended Floor Slabs:
    - a. Standard weight galvanized iron pipe, Schedule 40 PVC, or 14 ga (2 mm) galvanized sheet metal.
- D. Valves:
  - 1. Valves of same type shall be of same manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLERS

- A. Acceptable Installers:
  - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

### 3.2 EXAMINATION

- A. Drawings:
  - 1. Plumbing Drawings show general arrangement of piping, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
  - 2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing Drawings.
  - 3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work

and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

**B. Verification Of Conditions:**

1. Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work. Examine adjoining work on which plumbing work is dependent for efficiency and report work that requires correction.
2. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.
3. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.
4. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

**C. Unforeseen Conditions:**

1. Relocate/or remove and reinstall, any piping or plumbing fixtures or devices which are encountered during demolition which conflict with the new construction or which are to accommodate the new construction. The piping, devices, or fixtures are to be relocated to accommodate the new construction and service shall be maintained for its function. Remove device covers or fixtures which conflict with the new construction and reinstall the same after other trades have completed their work.

### **3.3 PREPARATION**

**A. Changes Due To Equipment Selection:**

1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings showing proposed installations.
2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
3. Provide additional motors, valves, controllers, fittings, and other equipment required for proper operation of systems resulting from selection of equipment.
4. Be responsible for proper location of rough-in and connections provided under other Divisions.

### **3.4 INSTALLATION**

**A. Interface With Other Work:**

1. Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
2. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and confirm that they are properly installed.

**B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.**

**C. Locating Equipment:**

1. Arrange pipes and equipment to permit ready access to valves, cocks, unions, traps, and to clear openings of doors and access panels.
2. Adjust locations of pipes, equipment, and fixtures to accommodate work to interferences anticipated and encountered.

3. Install plumbing work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
  4. Determine exact route and location of each pipe before fabrication.
    - a. Right-Of-Way:
      - 1) Lines that pitch shall have right-of-way over those that do not pitch. For example, plumbing drains shall normally have right-of-way.
      - 2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.
    - b. Offsets, Transitions, and Changes in Direction:
      - 1) Make offsets, transitions, and changes in direction in pipes as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
      - 2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.
- D. Penetration Firestops:
1. Install Penetration Firestop System appropriate for penetration at plumbing systems penetrations through walls, ceilings, roofs, and top plates of walls.
- E. Sealants:
1. Seal openings through building exterior caused by penetrations of elements of plumbing systems.
  2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.
- F. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus:
1. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper installation of plumbing systems.
  2. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings:
    - a. Arrange so as to facilitate removal of tube bundles.
    - b. Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.
      - 1) Make connections of dissimilar metals with di-electric unions.
      - 2) Install valves and unions ahead of traps and strainers. Provide unions on both sides of traps.
    - c. Do not use reducing bushings, bull head tees, close nipples, or running couplings. Street elbows are allowed only on potable water pipe 3/4 inch (19 mm) in diameter and smaller.
    - d. Install piping systems so they may be easily drained
    - e. Install piping to insure noiseless circulation.
    - f. Place valves and specialties to permit easy operation and access. Valves shall be regulated, packed, and glands adjusted at completion of work before final acceptance.
  3. Do not install piping in shear walls.
  4. Cut piping accurately to measurements established at site. Remove burr and cutting slag from pipes.
  5. Work piping into place without springing or forcing. Make piping connections to pumps and other equipment without strain at piping connection. Remove bolts in flanged connections or disconnect piping to demonstrate that piping has been so connected, if requested.
  6. Make changes in direction with proper fittings.
  7. Expansion of Thermoplastic Pipe:
    - a. Provide for expansion in every 30 feet (9 meters) of straight run.
    - b. Provide 12 inch (300 mm) offset below roof line in each vent line penetrating roof.
  8. Expansion of PEX Pipe: Allow for expansion and contraction of PEX pipe as recommended by Pipe Manufacturer.
- G. Sleeves:
1. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete slabs on grade.

2. Provide sleeves around pipes passing through concrete or masonry floors, walls, partitions, or structural members. Seal sleeves with specified sealants. Follow Pipe Manufacturer's recommendations for PEX pipe penetrations through studs and floor slabs.
3. Sleeves through floors shall extend 1/4 inch (6 mm) above floor finish in mechanical equipment rooms above basement floor. In other rooms, sleeves shall be flush with floor.
4. Sleeves through floors and foundation walls shall be watertight.

H. Escutcheons:

1. Provide spring clamp plates where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.

### 3.5 REPAIR / RESTORATION

- A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it:
1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
  2. Surface finishes shall exactly match existing finishes of same materials.

### 3.6 FIELD QUALITY CONTROL

A. Field Tests:

1. Perform tests on plumbing piping systems. Furnish devices required for testing purposes.

B. Non-Conforming Work:

1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.
2. Repeat tests on new material, if requested.

### 3.7 CLEANING

A. Remove dirt, grease, and other foreign matter from each length of piping before installation:

1. After each section of piping used for movement of water or steam is installed, flush with clean water, except where specified otherwise.
2. Arrange temporary flushing connections for each section of piping and arrange for flushing total piping system.
3. Provide temporary cross connections and water supply for flushing and drainage and remove after completion of work.

B. Clean exposed piping, equipment, and fixtures. Remove stickers from fixtures and adjust flush valves.

### 3.8 CLOSEOUT ACTIVITIES

A. Instruction of Owner:

1. Instruct building maintenance personnel and Stake Physical Facilities Representative in operation and maintenance of plumbing systems utilizing Operation And Maintenance Manual when so doing.
2. Conduct instruction period after Substantial Completion inspection when systems are properly working and before final payment is made.

### **3.9 PROTECTION**

- A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.

### **3.10 SEISMIC RESTRAINT**

- A. Restrain all equipment and piping in compliance with the Authority Having Jurisdiction and the Building Code.

**END OF SECTION**

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**SECTION 22 0529****HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Common hanger and support requirements and procedures for plumbing systems.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Paint identification for gas piping used in HVAC equipment.
- C. Related Requirements:
  - 1. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
  - 2. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
  - 3. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.
  - 4. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.
  - 5. Section 23 0529: 'Hangers And Supports For HVAC Piping And Equipment' for gas piping used with HVAC equipment.
  - 6. Section 23 0553: 'Identification For HVAC Piping And Equipment' for paint identification of gas piping used with HVAC equipment.

**1.2 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's catalog data for each manufactured item.

**PART 2 - PRODUCTS****2.1 ASSEMBLIES**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Anvil International, Portsmouth, NH [www.anvilintl.com](http://www.anvilintl.com).
    - b. Cooper B-Line, Highland, IL [www.b-line.com](http://www.b-line.com).
    - c. Unistrut, Wayne, MI [www.tyco-unistrut.com](http://www.tyco-unistrut.com).
- B. Materials:
  - 1. Hangers, Rods, And Inserts
    - a. Galvanized and UL approved for service intended.
    - b. Support horizontal piping from hangers or on roller assemblies with channel supports, except where trapeze type hangers are explicitly shown on Drawings. Hangers shall have double nuts.
      - 1) Support insulated pipes 2 inches (50 mm) in diameter and smaller with adjustable swivel ring hanger with insulation protection shield. Gauge and length of shield shall be in accordance with Anvil design data.
        - a) Type Two Acceptable Products:
          - (1) Swivel Ring Hanger: Anvil Fig. 69.

- (2) Insulation Protection Shield: Anvil Fig. 167.
- (3) Equals by Cooper B-Line.
- 2) Support insulated pipes 2-1/2 inches (64 mm) in diameter and larger with clevis hanger or roller assembly with an insulation protection shield. Gauge and length of shield shall be according to Anvil design data.
  - a) Type Two Acceptable Products:
    - (1) Clevis Hanger: Anvil Fig. 260.
    - (2) Roller Assembly: Anvil Fig. 171.
    - (3) Insulation Protection Shield: Anvil Fig. 167.
    - (4) Equals by Cooper B-Line.
- 3) Support uninsulated copper pipe 2 inches (50 mm) in diameter and smaller from swivel ring hanger, copper plated and otherwise fully suitable for use with copper tubing. Support non-copper uninsulated pipes from swivel ring hanger.
  - a) Type Two Acceptable Products:
    - (1) Swivel Ring Hanger For Copper Pipe: Anvil Fig. CT-69.
    - (2) Swivel Ring Hanger For Other Pipe: Anvil Fig. 69.
    - (3) Equals by Cooper B-Line.
- 4) Support uninsulated copper pipe 2-1/2 inches (64 mm) in diameter and larger from clevis hanger, copper plated hangers and otherwise fully suitable for use with copper tubing. Support non-copper uninsulated pipes from clevis hanger.
  - a) Type Two Acceptable Products:
    - (1) Clevis Hanger For Copper Pipe: Anvil Fig. CT-65.
    - (2) Clevis Hanger For Other Pipe: Anvil Fig. 260.
    - (3) Equals by Cooper B-Line.
- c. Support rods for single pipe shall be in accordance with following table:

Rod Diameter	Pipe Size
3/8 inch	2 inches and smaller
1/2 inch	2-1/2 to 3-1/2 inches

- d. Support rods for multiple pipe supported on steel angle trapeze hangers shall be in accordance with following table:

Rods		Number of Pipes per Hanger for Each Pipe Size						
Number	Diameter	2 Inch	2.5 Inch	3 Inch	4 Inch	5 Inch	6 Inch	8 Inch
2	3/8 Inch	Two	0	0	0	0	0	0
2	1/2 Inch	Three	Three	Two	0	0	0	0

- 1) Size trapeze angles so bending stress is less than 10,000 psi (69 MPa).
- e. Riser Clamps For Vertical Piping:
  - 1) Type Two Acceptable Products:
    - a) Anvil Fig. 261.
    - b) Equals by Cooper B-Line.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Piping:
  - 1. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.
    - a. Except for underground pipe, suspend piping from roof trusses or clamp to vertical walls using Unistrut and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
    - b. Supports For Horizontal Piping:



- 1) Support metal piping at 96 inches (2 400 mm) on center maximum for pipe 1-1/4 inches (32 mm) or larger and 72 inches (1 800 mm) on center maximum for pipe 1-1/8 inch (29 mm) or less.
- 2) Support thermoplastic pipe at 48 inches (1 200 mm) on center maximum.
- 3) Provide support at each elbow. Install additional support as required.
- c. Supports for Vertical Piping:
  - 1) Place riser clamps at each floor or ceiling level.
  - 2) Securely support clamps by structural members, which in turn are supported directly from building structure.
  - 3) Provide clamps as necessary to brace pipe to wall.
2. Gas piping Identification:
  - a. Apply paint identification for gas piping used with HVAC equipment as specified in Section 23 0553.

**END OF SECTION**

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**SECTION 22 1313****FACILITY SANITARY SEWERS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install soil, waste, and vent piping systems and connect with existing waste and vent lines as described on bid documents. Field verify existing piping as required.
  - 2. Perform excavation required by work of this Section.
- B. Related Requirements:
  - 1. Section 07 8400: 'Firestopping' for quality of firestopping material.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. American National Standards Institute / American Water Works Association:
    - a. ANSI/AWWA C110/A21.10-12, 'Ductile-Iron and Gray-Iron Fittings'.
    - b. ANSI/AWWA C111/A21.11-12, 'Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings'.
    - c. ANSI/AWWA C115/A21.15-11, 'Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges'.
    - d. ANSI/AWWA C116/A21.16-15, 'Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service'.
    - e. ANSI/AWWA C150/A21.50-14, 'Thickness Design of Ductile-Iron Pipe'.
    - f. ANSI/AWWA C151/A21.51-09, 'Ductile-Iron Pipe, Centrifugally Cast, for Water'.
    - g. ANSI/AWWA C153/A21.53-11, 'Ductile-Iron Compact Fittings for Water Service'.
  - 2. American Water Works Association (AWWA):
    - a. AWWA M41, 'Ductile-Iron Pipe and Fittings' (3rd Edition).
  - 3. ASTM International:
    - a. ASTM A74-15, 'Standard Specification for Cast Iron Soil Pipe and Fittings'.
    - b. ASTM A888-15, 'Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications'.
    - c. ASTM C564-14, 'Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings'.
    - d. ASTM D2235-04(2011), 'Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings'.
    - e. ASTM D2321-14, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications'.
    - f. ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
    - g. ASTM D3034-14, 'Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings'.
    - h. ASTM F628-12, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe With a Cellular Core'.
    - i. ASTM F656-15, 'Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings'.
    - j. ASTM F891-10, 'Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core'.
  - 4. Cast Iron Soil Pipe Institute:

- a. CISPI Standard 301-09, 'Standard Specification for Hubless Cast Iron Soil Pipe End Fittings for Sanitary & Storm Drain, Waste, and Vent Piping Applications'.
  - b. CISPI 310-11, 'Standard Specification for Couplings for use in connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications'.
  - c. CISPI Handbook. 'Cast Iron Soil Pipe and Fittings Handbook' (2006).
5. International Code Council:
- a. ICC IPC-2015, 'International Plumbing Code'.

## PART 2 - PRODUCTS

### 2.1 SYSTEMS

#### A. Manufacturers:

1. Manufacturer Contact List:
  - a. American Brass & Iron (AB&I), Oakland, CA [www.abifoundry.com](http://www.abifoundry.com).
  - b. Clamp-All Corp, Haverhill, MA [www.clampall.com](http://www.clampall.com).
  - c. Anaco-Husky, Corona, CA [www.anaco-husky.com](http://www.anaco-husky.com).
  - d. Josam Co, Michigan City, IN [www.josam.com](http://www.josam.com).
  - e. Jay R. Smith Manufacturing Co, Montgomery, AL [www.jrsmith.com](http://www.jrsmith.com).
  - f. MG Piping Products Co, Stanton, CA [www.mgcoupling.com](http://www.mgcoupling.com).
  - g. Mifab Manufacturing Inc, Chicago, IL [www.mifab.com](http://www.mifab.com).
  - h. Mission Rubber Co., Corona, CA [www.missionrubber.com](http://www.missionrubber.com).
  - i. Wade Div Tyler Pipe, Tyler, TX [www.wadedrains.com](http://www.wadedrains.com).
  - j. Watts Drainage, Spindale, NC [www.watts.com](http://www.watts.com) or Watts Industries, Burlington, ON, Canada [www.wattscda.com](http://www.wattscda.com).
  - k. Zurn Cast Metals, Erie, PA or Zurn Industries Limited, Mississauga, ON [www.zurn.com](http://www.zurn.com).

#### B. Performance:

1. Design Criteria:
  - a. Multiple materials have been listed for Contractor's reference. Do not mix PVC and ABS on project.
  - b. Minimum size of waste piping installed under floor slab on grade shall be 2 inches (50 mm).

#### C. Materials:

1. PVC Piping And Fittings: PVC Schedule 40 cellular core plastic pipe and pipe fittings meeting requirements of ASTM F891, joined using cement primer meeting requirements of ASTM F656 and pipe cement meeting requirements of ASTM D2564.
  - a. Furnish wall cleanouts with chrome wall cover and screw.
2. ABS Piping And Fittings: ABS Schedule 40 cellular core plastic pipe and pipe fittings meeting requirements of ASTM F628, joined with pipe cement meeting requirements of ASTM D2235.
  - a. Furnish wall cleanouts with chrome wall cover and screw.
3. Cast Iron Above Grade Piping And Vent Lines:
  - a. Approved Types:
    - 1) Service weight, single-hub or no-hub type cast iron soil pipe meeting requirements of ASTM A74.
    - 2) Vent lines 2-1/2 inches (64 mm) or smaller may be Schedule 40 galvanized steel.
  - b. Joint Material:
    - 1) Single-Hub: Rubber gaskets meeting requirements of ASTM C564.
    - 2) No-Hub Pipe: Neoprene gaskets with stainless steel cinch bands.
4. Cast Iron Fittings:
  - a. Cast Iron Pipe: Hub and spigot, except fittings for no-hub pipe shall be no-hub, and meet requirements of ASTM A74.
    - 1) Joint Material: Rubber gaskets meeting requirements of ASTM C564.
    - 2) Galvanized Pipe: Screwed Durham tarred drainage type.
  - b. Traps installed on cast iron bell and spigot pipe shall be service weight cast iron. Traps installed on threaded pipe shall be recess drainage pattern type.

- c. P-Traps:
  - 1) Trap shall have clean out plug if installed in other than slab on grade.
  - 2) Type Two Acceptable Products.
    - a) JR Smith: 7220 deep seal cast iron.
    - b) Mifab: MI-950.
    - c) Zurn: Zurn Z-1000.
    - d) Equal as approved by Architect before installation. See Section 01 6200.
- 5. Cleanouts for Cast Iron Piping:
  - a. Furnish wall cleanouts with chrome wall cover and screw.
  - b. Type Two Acceptable Products:
    - 1) Finish Floors:
      - a) Josam: 56010.
      - b) J. R. Smith: 4023.
      - c) Mifab: C1100C-R-1.
      - d) Wade: W-6000.
      - e) Watts: CO-200-R.
      - f) Zurn: Z-1402.
    - 2) Resilient Flooring:
      - a) Josam: 56010-12.
      - b) J. R. Smith: 4140.
      - c) Mifab: C1100C-T-1.
      - d) Wade: W-6000-T.
      - e) Watts: CO-200-T.
      - f) Zurn: Z-1400.
    - 3) Finished Wall:
      - a) Josam: 58790.
      - b) J. R. Smith: 4530.
      - c) Mifab: C1460RD.
      - d) Wade: W8560E.
      - e) Watts: CO-460-RD.
      - f) Zurn: Z-1446.
    - 4) Exposed Drain Lines:
      - a) Josam: 58910.
      - b) J. R. Smith: 4510.
      - c) Mifab: C1460.
      - d) Wade: W8560B.
      - e) Watts: CO-460.
      - f) Zurn: Z-1440.
    - 5) General Purpose:
      - a) Josam: 58900.
      - b) J. R. Smith: 4400.
      - c) Mifab: C1300-MF
      - d) Wade: W8550E.
      - e) Watts: CO-380.
      - f) Zurn: Z-1440.
    - 6) Equal as approved by Architect before installation. See Section 01 6200.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Excavate and backfill with following additional requirements:
  - 1. Runs shall be as close as possible to those shown on Drawings.
  - 2. Excavate to required depth and grade to obtain fall required. Grade soil and waste lines within building perimeter 1/4 inch (6 mm) fall in one foot (300 mm) in direction of flow.
  - 3. Bottom of trenches shall be hard. Tamp as required.
  - 4. Remove debris from trench before laying of pipe.
  - 5. Do not cut trenches near footings without consulting Architect.

- B. Metal Pipe And Fittings:
1. Provide depression under bell of each joint to maintain even bearing of sewer pipe.
  2. Connect to street main as required by local authorities.
  3. Use jacks to make-up gasketed joints.
  4. Do not caulk threaded work.
  5. Use torque wrench to obtain proper tension in cinch bands when using hubless cast iron pipe. Butt ends of pipe against centering flange of coupling.
- C. Thermoplastic Pipe And Fittings:
1. General: Piping and joints shall be clean and installed according to Manufacturer's recommendations. Break down contaminated joints, clean seats and gaskets and reinstall.
  2. Above Grade: Locate pipe hangers every 4 feet (1.2 m) on center maximum and at elbows.
  3. Below Grade:
    - a. Install in accordance with Manufacturer's recommendations and ASTM D2321.
    - b. Stabilize unstable trench bottoms.
    - c. Bed pipe true to line and grade with continuous support from firm base.
      - 1) Bedding depth: 4 to 6 inches (100 to 150 mm).
      - 2) Material and compaction to meet ASTM standard noted above.
    - d. Excavate bell holes into bedding material so pipe is uniformly supported along its entire length. Blocking to grade pipe is forbidden.
    - e. Trench width at top of pipe:
      - 1) Minimum: 18 inches (450 mm) or diameter of pipe plus 12 inches (300 mm), whichever is greater.
      - 2) Maximum: Outside diameter of pipe plus 24 inches (600 mm).
    - f. Do not use backhoe or power equipment to assemble pipe.
    - g. Initial backfill shall be 12 inches (300 mm) above top of pipe with material specified in referenced ASTM standard.
    - h. Minimum cover over top of pipe not under building slab:
      - 1) 36 inches (900 mm) before wheel loading.
      - 2) 48 inches (1 200 mm) before compaction.
- D. Install piping so cleanouts may be installed as follows:
1. Where shown on Drawings and near bottom of each stack and riser.
  2. At every 135 degrees of accumulative change in direction for horizontal lines.
  3. Every 100 feet (30 meters) of horizontal run.
  4. Extend piping to accessible surface. Do not install piping so cleanouts must be installed in carpeted floors. In such locations, configure piping so wall type cleanouts may be used.
- E. Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have seal trap in connection with complete venting system so gasses pass freely to atmosphere with no pressure or siphon condition on water seal.
- F. Vent entire waste system to atmosphere. Join lines together in fewest practicable numbers before projecting above roof. Set back vent lines so they will not pierce roof near edge or valley. Vent line terminations shall be:
1. 6 inches (150 mm) minimum above roof and 12 inches (300 mm) minimum from any vertical surface.
  2. Same size as vent pipe.
  3. In areas where minimum design temperature is below 0 deg F (minus 18 deg C) or where frost or snow closure may be possible:
    - a. Vent line terminations shall be same size as vent pipe, except no smaller than 2 inches (50 mm) in diameter.
    - b. Vents shall terminate 10 inches (250 mm) minimum above roof or higher if required by local codes.
- G. Furnish and install firestopping at penetrations of fire-rated structures as required under Sections 07 8400 and 22 0501.
- H. If test Tees are used for testing, plug Tees so wall finish can be installed. Do not leave as exposed cleanouts.

### 3.2 FIELD QUALITY CONTROL

#### A. Field Tests:

1. Conduct tests for leaks and defective work. Notify Architect before testing.
2. Metal Pipe System: After backfilling and compacting of trenches is complete but before placing floor slab, fill waste and vent system with water to roof level or 10 feet (3 meters) minimum, and show no leaks for two hours. Uncover pipe and correct leaks and defective work. Re-backfill and compact and re-test.
3. Thermoplastic Pipe System:
  - a. Before backfilling and compacting of trenches, Fill waste and vent system with water to roof level or 10 feet (3 meters) minimum, and show no leaks for two hours. Correct leaks and defective work.
  - b. After backfilling and compacting of trenches is complete but before placing floor slab, re-test as specified above. Uncover pipe and correct leaks and defective work. Re-backfill and compact and re-test.

**END OF SECTION**

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**SECTION 22 1319****FACILITY SANITARY SEWER SPECIALTIES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But Not Installed Under this Section as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 22 0501: 'Common Plumbing Requirements'.
  - 2. Section 22 1313: 'Facility Sanitary Sewers' for installation of miscellaneous sanitary sewer specialties.

**PART 2 - PRODUCTS****2.1 SYSTEMS**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Josam Co, Michigan City, IN [www.josam.com](http://www.josam.com).
    - b. Jay R. Smith Manufacturing Co, Montgomery, AL [www.jrsmith.com](http://www.jrsmith.com).
    - c. Mifab Manufacturing Inc, Chicago, IL [www.mifab.com](http://www.mifab.com).
    - d. Proset Systems, Lawrenceville, GA [www.prosetsystems.com](http://www.prosetsystems.com).
    - e. Sureseal Manufacturing, Tacoma WA [www.thesureseal.com](http://www.thesureseal.com).
      - 1) Contact Information:
        - a) All Areas except Idaho and Utah: Rick Ensley (253) 564-0624, [rick@thesureseal.com](mailto:rick@thesureseal.com).
        - b) Idaho and Utah Areas: Mark Evans, phone (801) 748-1222, [mark@franklinjames.com](mailto:mark@franklinjames.com).
    - f. Wade Div Tyler Pipe, Tyler, TX [www.wadedrains.com](http://www.wadedrains.com).
    - g. Watts Drainage, Spindale, NC [www.watts.com](http://www.watts.com) or Watts Industries, Burlington, ON, Canada [www.wattscda.com](http://www.wattscda.com).
    - h. Zurn Industries, LLC, Erie PA [www.zurn.com](http://www.zurn.com). or Zurn Industries Ltd, Mississauga, ON (905) 795-8844.
- B. Performance:
  - 1. Design Criteria:
    - a. All materials NOT required to be low lead compliant.
- C. Components:
  - 1. Drains And Drain Accessories:
    - a. Floor Drain FD-1:
      - 1) Approved types with deep seal trap and chrome plated strainer, and 2-1/2 to 4 inch (64 to 100 mm) diameter by 4-1/4 inch (108 mm) high chrome plated funnel.
      - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) Josam: 30000-50-Z-5A-CP.
        - b) J. R. Smith: 3510-F11-CP.
        - c) Mifab: F-1100-C.
        - d) Wade: 1100.
        - e) Watts: FD-100-EF-1.
        - f) Zurn: 415.

D. Accessories:

a. Floor Drains:

- 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a) Trap guard by Proset Systems. Provide model number to match floor drain.
  - b) Trap seal by Sureseal. Provide model number to match floor drain.

**PART 3 - EXECUTION: Not Used**

**END OF SECTION**

## **DIVISION 23: HEATING, VENTILATING, AND AIR-CONDITIONING**

### **23 0500 COMMON WORK RESULTS FOR HVAC**

- 23 0501 COMMON HVAC REQUIREMENTS
- 23 0529 HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
- 23 0553 IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
- 23 0713 DUCT INSULATION
- 23 0719 HVAC PIPING INSULATION
- 23 0933 ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC

### **23 1000 FACILITY FUEL SYSTEMS**

- 23 1123 FACILITY LPG PIPING

### **23 2000 HVAC PIPING AND PUMPS**

- 23 2213 STEAM AND STEAM CONDENSATE PIPING
- 23 2214 STEAM AND STEAM CONDENSATE PIPING SPECIALTIES
- 23 2300 REFRIGERANT PIPING
- 23 2600 CONDENSATE DRAIN PIPING

### **23 3000 HVAC AIR DISTRIBUTION**

- 23 3001 COMMON DUCT REQUIREMENTS
- 23 3114 LOW-PRESSURE METAL DUCTS
- 23 3300 AIR DUCT ACCESSORIES
- 23 3316 FIRE DAMPERS
- 23 3346 FLEXIBLE DUCTS
- 23 3713 DIFFUSERS REGISTERS AND GRILLES
- 23 3714 LOUVERS AND VENTS
- 23 3723 HVAC GRAVITY VENTILATORS

### **23 4000 HVAC AIR CLEANING DEVICES**

- 23 4100 AIR FILTERS

### **23 5000 CENTRAL HEATING EQUIPMENT**

- 23 5135 AIR PIPING
- 23 5417 GAS-FIRED FURNACES

### **23 6000 CENTRAL COOLING EQUIPMENT**

- 23 6214 COMPRESSOR UNITS: AIR CONDITIONING (5 TONS OR LESS)

END OF TABLE OF CONTENTS

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**SECTION 23 0501****COMMON HVAC REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Common requirements and procedures for HVAC systems.
  - 2. Responsibility for proper operation of electrically powered equipment furnished under this Division.
  - 3. Interface with Testing And Balancing Agency.
  - 4. Furnish and install sealants relating to installation of systems installed under this Division.
  - 5. Furnish and install Firestop Penetration Systems for HVAC system penetrations as described in Contract Documents.
  - 6. Furnish and install sound, vibration, and seismic control elements.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Sleeves, inserts, and equipment for mechanical systems installed under other Sections.
- C. Related Requirements:
  - 1. Section 07 9213: Quality of sealants used at building exterior.
  - 2. Section 07 9219: Quality of acoustical sealants.
  - 3. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.
  - 4. Section 26 2913: Magnetic starters and thermal protective devices (heaters) not factory mounted integral part of mechanical equipment.
  - 5. Division 26: Raceway and conduit, unless specified otherwise, line voltage wiring, outlets, and disconnect switches.
  - 6. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.

**1.2 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's catalog data for each manufactured item.
      - 1) Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
      - 2) Include name, address, and phone number of each supplier.
  - 2. Shop Drawings:
    - a. Schematic control diagrams for each separate fan system, heating system, control panel, etc. Each diagram shall show locations of all control and operational components and devices. Mark correct operating settings for each control device on these diagrams.
    - b. Diagram for electrical control system showing wiring of related electrical control items such as firestats, fuses, interlocks, electrical switches, and relays. Include drawings showing electrical power requirements and connection locations.
    - c. Drawing of each temperature control panel identifying components in panels and their function.
    - d. Other shop drawings required by Division 23 trade Sections.
- B. Informational Submittals:

1. Qualification Statement:
  - a. HVAC Firm:
    - 1) Provide Qualification documentation if requested by Architect or Owner.
  - b. Installer:
    - 1) Provide Qualification documentation if requested by Architect or Owner.
- C. Closeout Submittals:
  1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data (Modify and add to requirements of Section 01 7800):
      - 1) At beginning of HVAC section of Operations And Maintenance Manual, provide master index showing items included.
        - a) Provide name, address, and phone number of Architect, Architect's Mechanical Engineer, General Contractor, and HVAC, Sheet Metal, Refrigeration, and Temperature Control subcontractors.
        - b) Identify maintenance instructions by using same equipment identification used in Contract Drawings. Maintenance instructions shall include:
          - (1) List of HVAC equipment used indicating name, model, serial number, and nameplate data of each item together with number and name associated with each system item.
          - (2) Manufacturer's maintenance instructions for each piece of HVAC equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance and lubrication instructions.
          - (3) Summary list of mechanical equipment requiring lubrication showing name of equipment, location, and type and frequency of lubrication.
          - (4) Manual for Honeywell LCBS controls published by Honeywell.
        - c) Provide operating instructions to include:
          - (1) General description of each HVAC system.
          - (2) Step by step procedure to follow in putting each piece of HVAC equipment into operation.
          - (3) Provide diagrams for electrical control system showing wiring of items such as smoke detectors, fuses, interlocks, electrical switches, and relays.
      - b. Warranty Documentation:
        - 1) Include copies of warranties required in individual Sections of Division 23.
      - c. Record Documentation:
        - 1) Manufacturers documentation:
          - a) Copies of approved shop drawings.
      - d. Equipment Start-Ups:
        - 1) Include copies of equipment start-up checklists required in individual Sections of Division 23.

### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  1. Perform work in accordance with applicable provisions of Gas Ordinances applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
  2. In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing work affected by such differences.
  3. Identification:
    - a. Motor and equipment name plates as well as applicable UL / ULC and AGA / CGA labels shall be in place when Project is turned over to Owner.
- B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
  1. Company:
    - a. Company specializing in performing work of this section.
      - 1) Minimum five (5) years' experience in HVAC installations.
      - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.

- b. Upon request, submit documentation.
2. Installer:
  - a. Licensed for area of Project.
  - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
  - c. Upon request, submit documentation.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  1. Accept valves on site in shipping containers with labeling in place.
- B. Storage And Handling Requirements:
  1. In addition to requirements specified in Division 01:
    - a. Stored material shall be readily accessible for inspection by Architect until installed.
    - b. Store items subject to moisture damage, such as controls, in dry, heated spaces.
    - c. Provide temporary protective coating on cast iron and steel valves.
    - d. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
  2. Protect bearings during installation. Thoroughly grease steel shafts to prevent corrosion.

#### 1.5 WARRANTY

- A. Manufacturer Warranty:
  1. Provide certificates of warranty for each piece of equipment made out in favor of Owner. Clearly record 'start-up' date of each piece of equipment on certificate.
- B. Special Warranty:
  1. Guarantee HVAC systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
  2. If HVAC sub-contractor with offices located more than 150 miles from Project site is used, provide service / warranty work agreement for warranty period with local HVAC sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

### PART 2 - PRODUCTS

#### 2.1 COMPONENTS

- A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.
- B. Pipe And Pipe Fittings:
  1. Use domestic made pipe and pipe fittings on Project.
  2. Weld-O-Let and Screw-O-Let fittings are acceptable.
- C. Sleeves:
  1. In Framing: Standard weight galvanized iron pipe, Schedule 40 PVC, or 14 ga galvanized sheet metal two sizes larger than bare pipe or insulation on insulated pipe.
  2. In Concrete And Masonry: Sleeves through outside walls, interior shear walls, and footings shall be schedule 80 black steel pipe with welded plate.
- D. Valves:
  1. Valves of same type shall be of same manufacturer.

## **PART 3 - EXECUTION**

### **3.1 INSTALLERS**

- A. Acceptable Installers:
1. AMS – Justin Vigh (801) 973-4707
  2. Custom Mechanical Design – Kurt Giles (801) 296-2600
  3. JTS Mechanical – Josh Richins (801) 510-1377
  4. Sorenson Heating & A/C – Harold Sorenson (801) 446-6412
  5. Systems Complete – Wally Erickson (801) 319-8083

### **3.2 EXAMINATION**

- A. Drawings:
1. HVAC Drawings show general arrangement of piping, ductwork, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
  2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over HVAC Drawings.
  3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.
- B. Verification Of Conditions:
1. Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work. Examine adjoining work on which mechanical work is dependent for efficiency and report work that requires correction.
  2. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.
  3. Ensure that items furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation suits true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items furnished will fit space available.
  4. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.
- C. Unforeseen Conditions:
1. Relocate/or remove and reinstall ducts, piping, grilles, dampers, louvers, fixtures or any other mechanical equipment or devices which are encountered during demolition which conflict with the new construction or which are to accommodate the new construction. Any equipment, piping, grilles, dampers, louvers or fixtures to remain shall be reinstalled at the completion of this work.

### **3.3 PREPARATION**

- A. Changes Due To Equipment Selection:
1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings, if requested by Architect, showing proposed installations.
  2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
  3. Provide any additional motors, valves, controllers, fittings, and other additional equipment required for proper operation of system resulting from selection of equipment.



4. Be responsible for the proper location of roughing-in and connections provided under other Divisions.

### 3.4 INSTALLATION

- A. Interface With Other Work:
  1. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and see they are properly installed.
  2. Electrical: Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
  3. Testing And Balancing:
    - a. Put HVAC systems into full operation and continue their operation during each working day of testing and balancing.
    - b. Make changes in pulleys, belts, fan speeds, and dampers or add dampers as required for correct balance as recommended by Testing And Balancing Agency and at no additional cost to Owner.
- B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.
- C. Locating Equipment:
  1. Arrange pipes, ducts, and equipment to permit ready access to valves, cocks, unions, traps, filters, starters, motors, control components, and to clear openings of doors and access panels.
  2. Adjust locations of pipes, ducts, switches, panels, and equipment to accommodate work to interferences anticipated and encountered.
  3. Install HVAC work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
  4. Determine exact route and location of each pipe and duct before fabrication.
    - a. Right-Of-Way:
      - 1) Lines that pitch shall have right-of-way over those that do not pitch. For example, steam, steam condensate, and drains shall normally have right-of-way.
      - 2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.
    - b. Offsets, Transitions, and Changes in Direction:
      - 1) Make offsets, transitions, and changes in direction in pipes and ducts as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
      - 2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.
- D. Piping:
  1. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus.
    - a. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper erection of systems of piping in every respect.
    - b. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings.
      - 1) Arrange so as to facilitate removal of tube bundles.
      - 2) Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.
        - a) Make connections of dissimilar metals with di-electric unions.
        - b) Install valves and unions ahead of traps and strainers. Provide unions on both sides of traps.
      - 3) Do not use reducing bushings, street elbows, bull head tees, close nipples, or running couplings.

- 4) Install piping systems so they may be easily drained. Provide drain valves at low points and manual air vents at high points in hot water heating and cooling water piping.
- 5) Install piping to insure noiseless circulation.
- 6) Place valves and specialties to permit easy operation and access. Valves shall be regulated, packed, and glands adjusted at completion of work before final acceptance.
- c. Do not install piping in shear walls.
2. Properly make adequate provisions for expansion, contraction, slope, and anchorage.
  - a. Cut piping accurately for fabrication to measurements established at site. Remove burr and cutting slag from pipes.
  - b. Work piping into place without springing or forcing. Make piping connections to pumps and other equipment without strain at piping connection. Remove bolts in flanged connections or disconnect piping to demonstrate that piping has been so connected, if requested.
  - c. Make changes in direction with proper fittings.
  - d. Expansion of Thermoplastic Pipe:
    - 1) Provide for expansion in every 30 feet of straight run.
    - 2) Provide 12 inch offset below roof line in each vent line penetrating roof.
3. Provide sleeves around pipes passing through concrete or masonry floors, walls, partitions, or structural members. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete floors on grade. Seal sleeves with specified sealants.
  - a. Sleeves through floors shall extend 1/4 inch above floor finish in mechanical equipment rooms above basement floor. In other rooms, sleeves shall be flush with floor.
  - b. Sleeves through floors and foundation walls shall be watertight.
4. Provide spring clamp plates (escutcheons) where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.
5. Remove dirt, grease, and other foreign matter from each length of piping before installation.
  - a. After each section of piping used for movement of water or steam is installed, flush with clean water, except where specified otherwise.
  - b. Arrange temporary flushing connections for each section of piping and arrange for flushing total piping system.
  - c. Provide temporary cross connections and water supply for flushing and drainage and remove after completion of work.
- E. Penetration Firestops: Install Penetration Firestop System appropriate for penetration at HVAC system penetrations through walls, ceilings, roofs, and top plates of walls.
- F. Sealants:
  1. Seal openings through building exterior caused by penetrations of elements of HVAC systems.
  2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.

### 3.5 REPAIR / RESTORATION

- A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
  1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
  2. Surface finishes shall exactly match existing finishes of same materials.

### 3.6 FIELD QUALITY CONTROL

- A. Field Tests:
  1. Perform tests on HVAC piping systems. Furnish devices required for testing purposes.
- B. Non-Conforming Work:
  1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.

2. Repeat tests on new material, if requested.

### 3.7 SYSTEM START-UP

- A. Off-Season Start-up:
  1. If Substantial Completion inspection occurs during heating season, schedule spring start-up of cooling systems. If inspection occurs during cooling season, schedule autumn start-up for heating systems.
  2. Notify Owner seven days minimum before scheduled start-up.
  3. Time will be allowed to completely service, test, check, and off-season start systems. During allowed time, train Owner's representatives in operation and maintenance of system.
  4. At end of off-season start-up, furnish Owner with letter confirming that above work has been satisfactorily completed.
- B. Preparations that are to be completed before start up and operation include, but are not limited to, following:
  1. Dry out electric motors and other equipment to develop and properly maintain constant insulation resistance.
  2. Make adjustments to insure that:
    - a. Equipment alignments and clearances are adjusted to allowable tolerances.
    - b. Nuts and bolts and other types of anchors and fasteners are properly and securely fastened.
    - c. Packed, gasketed, and other types of joints are properly made up and are tight and free from leakage.
    - d. Miscellaneous alignments, tightenings, and adjustings are completed so systems are tight and free from leakage and equipment performs as intended.
  3. Motors and accessories are completely operable.
  4. Inspect and test electrical circuitry, connections, and voltages to be properly connected and free from shorts.
  5. Adjust drives for proper alignment and tension.
  6. Make certain filters in equipment for moving air are new and of specified type.
  7. Properly lubricate and run-in bearings in accordance with Manufacturer's directions and recommendations.

### 3.8 CLEANING

- A. Clean exposed piping, ductwork, and equipment.
- B. No more than one week before Final Inspection, flush out bearings and clean other lubricated surfaces with flushing oil. Provide best quality and grade of lubricant specified by Equipment Manufacturer.
- C. Replace filters in equipment for moving air with new filters of specified type no more than one week before Final Inspection.

### 3.9 CLOSEOUT ACTIVITIES

- A. Instruction Of Owner:
  1. Instruct building maintenance personnel and Stake Physical Facilities Representative in operation and maintenance of mechanical systems utilizing Operation And Maintenance Manual when so doing.
    - a. Minimum Instruction Periods:
      - 1) HVAC: Four hours.
      - 2) Temperature Control: Four hours. (refer to Section 23 0933 for Training Requirements)
    - b. Conduct instruction periods after Substantial Completion inspection when systems are properly working and before final payment is made. None of these instructional periods shall overlap another.

**3.10 PROTECTION**

- A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.
- B. Do not operate pieces of equipment used for moving supply air without proper air filters installed properly in system.
- C. After start-up, continue necessary lubrication and be responsible for damage to bearings while equipment is being operated up to Substantial Completion.

**3.11 SEISMIC RESTRAINT**

- A. Restrain all equipment, piping, and ductwork in compliance with the Authority Having Jurisdiction and the Building Code.

**END OF SECTION**

**SECTION 23 0529**

**HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Common hanger and support requirements and procedures for HVAC systems.
- B. Related Requirements:
  - 1. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
  - 2. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
  - 3. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.
  - 4. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.

**1.2 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's catalog data for each manufactured item.

**PART 2 - PRODUCTS**

**2.1 ASSEMBLIES**

- A. Manufacturers:
  - 1. Class Two Quality Standard Approved Manufacturers. See Section 01 6200:
    - a. Anvil International, Portsmouth, NH [www.anvilintl.com](http://www.anvilintl.com).
    - b. Cooper B-Line, Highland, IL [www.cooperblin.com](http://www.cooperblin.com).
    - c. Erico International, Solon, OH [www.erico.com](http://www.erico.com).
    - d. Hilti Inc, Tulsa, OK [www.hilti.com](http://www.hilti.com).
    - e. Minerallac, Hampshire, IL [www.minerallac.com](http://www.minerallac.com).
    - f. Thomas & Betts, Memphis, TN [www.superstrut.com](http://www.superstrut.com).
    - g. Unistrut, Wayne, MI [www.unistrut.com](http://www.unistrut.com).

- B. Performance:
  - 1. Design Criteria:
    - a. Support rods for single pipe shall be in accordance with following table:

Rod Diameter	Pipe Size
3/8 inch	2 inches and smaller
1/2 inch	2-1/2 to 3-1/2 inches

- b. Support rods for multiple pipes supported on steel angle trapeze hangers shall be in accordance with following table:

Rods		Number of Pipes per Hanger for Each Pipe Size						
No.	Diameter	2 Inch	2.5 Inch	3 Inch	4 Inch	5 Inch	6 Inch	8 Inch
2	3/8 Inch	Two	0	0	0	0	0	0
2	1/2 Inch	Three	Three	Two	0	0	0	0

- 1) Size trapeze angles so bending stress is less than 10,000 psi.

**C. Materials:**

1. Hangers, Rods, Channels, Attachments, And Inserts:
  - a. Galvanized and UL approved for service intended.
  - b. Support horizontal piping from clevis hangers or on roller assemblies with channel supports, except where trapeze type hangers are explicitly shown on Drawings. Hangers shall have double nuts.
  - c. Class Two Quality Standards:
    - 1) Support insulated pipes with clevis hanger equal to Anvil Fig 260 or roller assembly equal to Anvil Fig 171 with an insulation protection shield equal to Anvil Fig 167. Gauge and length of shield shall be in accordance with Anvil design data.
    - 2) Except uninsulated copper pipes, support uninsulated pipes from clevis hanger equal to Anvil Fig 260. Support uninsulated copper pipe from hanger equal to Anvil Fig CT-65 copper plated hangers and otherwise fully suitable for use with copper tubing.
  - d. Riser Clamps For Vertical Piping:
    - 1) Class Two Quality Standard: Anvil Figure 261.
  - e. Concrete Inserts:
    - 1) Suitable for special nuts size 3/8 inch through 7/8 inch with yoke to receive concrete reinforcing rods, and with malleable iron lugs for attaching to forms.
    - 2) Class Two Quality Standards:
      - a) Standard Inserts: Anvil Figure 282.
    - 3) Class One Quality Standards:
      - a) Continuous Inserts: Unistrut P-3200 series.
      - b) Acceptable Manufacturers: Hilti, Thomas & Betts.
      - c) Equal as approved by Architect before installation. See Section 01 6200.
  - f. Equipment Support Channel:
    - 1) Class One Quality Standard: Unistrut P1000.
    - 2) Acceptable Manufacturers: Hilti, Thomas & Betts.
    - 3) Equal as approved by Architect before installation. See Section 01 6200.
  - g. Swivel Attachment:
    - 1) Class One Quality Standard: Unistrut EM3127.
    - 2) Acceptable Manufacturers: Hilti, Thomas & Betts.
    - 3) Equal as approved by Architect before installation. See Section 01 6200.

**EXECUTION****2.2 INSTALLATION****A. Piping:**

1. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.
  - a. Except for underground pipe, suspend piping from roof trusses or clamp to vertical walls using support channels and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
  - b. Supports For Horizontal Piping:
    - 1) Support metal piping at 96 inches mm on center maximum for pipe 1-1/4 inches or larger and 72 inches on center maximum for pipe 1-1/8 inch or less.
    - 2) Support thermoplastic pipe at 48 inches on center maximum.
    - 3) Provide support at each elbow. Install additional support as required.
  - c. Supports for Vertical Piping:
    - 1) Place riser clamps at each floor or ceiling level.
    - 2) Securely support clamps by structural members, which in turn are supported directly from building structure.
    - 3) Provide clamps as necessary to brace pipe to wall.

**END OF SECTION**

**SECTION 23 0553****IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT****PART 1 - GENERAL****1.1 SUMMARY**

- A. Products Furnished But not Installed Under This Section:
1. Identification of HVAC piping and equipment as described in Contract Documents including:
    - a. Paint identification for gas piping used in HVAC equipment.
    - b. Stencils and band colors for gas piping used in HVAC equipment.
- B. Related Requirements:
1. Section 22 0529: 'Hangers And Supports For Plumbing' for field installation of pipe stencils and band colors for identification for piping used with HVAC equipment.

**PART 2 - PRODUCTS****2.1 SYSTEMS**

- A. Description:
1. Abbreviations for Pipe Stencils and Equipment Identification and Band Colors for Pipe Identification:
    - a. Apply stenciled symbols and continuous painting as follows:
 

Pipe Type	Pipe Color	Symbol
Gas	Yellow	GAS
- B. Materials:
1. Category Four Approved Products and Manufacturers. See Section 01 6200 for definitions of Categories:
    - a. Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
  2. Description:
    - a. Ferrous Metal:
      - 1) New Surfaces: Use MPI(a) INT 5.1B Waterborne Light Industrial Finish system.
      - 2) Previously Finished Surfaces: Use MPI(r) RIN 5.1B Waterborne Light Industrial Finish system.
  3. Performance Requirements:
    - a. New Surfaces: MPI Premium Grade finish requirements.
    - b. Deteriorated Existing Surfaces: MPI Premium Grade finish requirements.
    - c. Sound Existing Surfaces: MPI Custom Grade finish requirements.
    - d. Maintain specified colors, shades, and contrasts.
  4. Paint (one coat):
    - a. Primer:
      - 1) Ferrous Metal:
        - a) MPI 107, 'Primer, Rust-Inhibitive, Water Based'.
          - (1) Color: white.
    - b. Finish Coat (two coats):
      - 1) Ferrous Metal:
        - a) MPI 153, 'Light Industrial Coating, Interior, Water Based, Semi-Gloss (MPI Gloss Level 5)'.
  5. Labels:
    - a. Equipment Identification:

- 1) Black formica, with white reveal when engraved.
- 2) Lettering to be 3/16 inch high minimum.

## **PART 3 - EXECUTION**

### **3.1 APPLICATION**

- A. Labels:
1. Identify following items with specified labels fastened to equipment with screws (unless noted otherwise):
    - a. ATC relay panels.
    - b. Unitary Controllers in mechanical spaces (attach label to wall directly above or below controllers).
    - c. New Furnaces.
    - d. New Condensing Units.
  2. Engrave following data from Equipment Schedules on Drawings onto labels:
    - a. Equipment mark.
    - b. Area served.
    - c. Thermostat zone number, when different from equipment mark.
    - d. Panel and breaker from which unit is powered.
- B. Painting:
1. New Surfaces:
    - a. Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.
  2. Existing Surfaces:
    - a. Remove deteriorated existing paint down to sound substrate by scraping and sanding. Feather edges of existing paint by sanding to be smooth with adjacent surfaces. Spot prime bare metal surfaces immediately.
    - b. Remove rust spots by sanding and immediately spot prime. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying full primer coat.
    - c. Clean existing sound painted surfaces as well as scraped and sanded existing painted surfaces as recommended by Paint Manufacturer.
    - d. Apply prime coat over entire surface to be painted.
    - e. Lightly sand entire surface.
    - f. Clean surface as recommended by Paint Manufacturer.
    - g. Apply finish coats.
  3. Leave equipment in like-new appearance.
  4. Only painted legends, directional arrows, and color bands are acceptable.
  5. Locate identifying legends, directional arrows, and color bands at following points on exposed piping of each piping system:
    - a. Adjacent to each item of equipment.
    - b. At point of entry and exit where piping goes through wall.
    - c. On each riser and junction.
    - d. Every 25 feet on long continuous lines.
    - e. Stenciled symbols shall be one inch high and black.

**END OF SECTION**



**SECTION 23 0713****DUCT INSULATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install thermal wrap duct insulation as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 3114: 'Low-Pressure Metal Ducts'.
  - 2. Section 23 3300: 'Acoustic Duct Accessories' for duct liner.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturer Contact List:
  - 1. Certainteed St Gobain, Valley Forge, PA [www.certainteed.com](http://www.certainteed.com).
  - 2. Johns-Manville, Denver, CO [www.jm.com](http://www.jm.com).
  - 3. Knauf Fiber Glass, Shelbyville, IN [www.knauffiberglass.com](http://www.knauffiberglass.com) or Toronto, ON (416) 593-4322.
  - 4. Manson Insulation Inc, Brossard, QB [www.isolationmanson.com](http://www.isolationmanson.com).
  - 5. Owens-Corning, Toledo, OH or Owens-Corning Canada Inc, Willowdale, ON [www.owenscorning.com](http://www.owenscorning.com).

**2.2 MATERIALS**

- A. Thermal Wrap Duct Insulation:
  - 1. 1-1/2 inch (38 mm) or 3 inch (76 mm) thick fiberglass with factory-laminated, reinforced aluminum foil scrim kraft facing and density of 0.75 lb / per cu ft (12 kg / per cu m).
  - 2. Thermal Conductivity: 0.27 BTU in/HR SF deg F at 75 deg F (24 deg C) maximum.
  - 3. Type One Acceptable Products:
    - a. Type 75 standard duct insulation by Certainteed St Gobain.
    - b. Microlite FSK by Johns-Manville.
    - c. Duct Wrap FSK by Knauf Fiber Glass.
    - d. Alley Wrap FSK by Manson Insulation Inc.
    - e. FRK by Owens-Corning.
    - f. Equal as approved by Architect before bidding. See Section 01 6200.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Thermal Wrap Duct Insulation:
  - 1. Install insulation as follows:
    - a. Within Building Insulation Envelope:
      - 1) 1-1/2 inches (38 mm) thick on rectangular outside air ducts and combustion air ducts.
      - 2) 1-1/2 inches (38 mm) thick on all round ducts.
    - b. Outside Building Insulation Envelope, Including Crawlspace:

- 1) 3 inch (76 mm) thick on round supply and return air ducts.
  - 2) 1-1/2 inch (38 mm) thick on rectangular, acoustically lined, supply and return air ducts.
2. Wrap insulation tightly on ductwork with circumferential joints butted and longitudinal joints overlapped minimum 2 inches (50 mm).
- a. Do not compress insulation except in areas of structural interference. Minimum thickness at corners shall be one inch (25 mm) thick.
  - b. Remove insulation from lap before stapling.
  - c. Staple seams at approximately 16 inches (400 mm) on center with outward clenching staples.
  - d. Seal seams with foil vapor barrier tape or vapor barrier mastic. Seal penetrations of facing to provide vapor tight system.
- B. Insulate outside of ceiling diffusers and diffuser drops same as ductwork.

**END OF SECTION**

**SECTION 23 0719****HVAC PIPING INSULATION****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install insulation on above ground refrigerant piping and fittings as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 0501: 'General HVAC Requirements'.
  - 2. Section 23 2300: 'Refrigerant Piping'.
  - 3. Section 23 2213: 'Steam and Steam Condensate Piping'.

**1.2 DELIVERY, STORAGE, AND HANDLING**

- A. Storage And Handling Requirements:
  - 1. Keep materials and work dry and free from damage.
  - 2. Replace wet or damaged materials at no additional cost to Owner.

**PART 2 - PRODUCTS****2.1 ASSEMBLIES**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Childers Products Co, Eastlake, OH [www.fosterproducts.com](http://www.fosterproducts.com).
    - b. Foster Products Corp, Oakdale, MN [www.fosterproducts.com](http://www.fosterproducts.com).
    - c. Johns-Manville, Denver, CO [www.jm.com](http://www.jm.com).
    - d. Knauf, Shelbyville, IN [www.knauffiberglass.com](http://www.knauffiberglass.com).
    - e. Manson, Brossard, BC, Canada [www.isolationmanson.com](http://www.isolationmanson.com).
    - f. Owens-Corning, Toledo, OH [www.owenscorning.com](http://www.owenscorning.com) or Owens-Corning Canada Inc, Willowdale, ON (416) 733-1600.
    - g. Ramco, Lawrenceville, NJ [www.ramco.com](http://www.ramco.com).
    - h. Nomac, Zebulon, NC [www.nomaco.com](http://www.nomaco.com).
    - i. Speedline Corp, Solon, OH [www.speedlinepvc.com](http://www.speedlinepvc.com).
- B. Materials:
  - 1. Steam-Heat Piping System (Steam Supply and Condensate Return):
    - a. Fiberglass with integral vapor barrier jacket designed for use on steam systems.
    - b. Thickness: For piping exposed to outdoor air, increase thickness by 1/2 inch.
      - 1) Pipe:
        - a) 1-1/2 inch for pipe sizes  $\leq$  1.5 inch diameter.
        - b) 3 inch for pipe sizes  $>$  1.5 inch diameter.
      - 2) Pipe Fittings:
        - a) 1-1/2 inch for pipe sizes  $\leq$  1.5 inch diameter.
        - b) 3 inch for pipe sizes  $>$  1.5 inch diameter.
    - c. Vapor Barrier Adhesive: As recommended by Insulation Manufacturer.
    - d. Hydraulic Insulating Cement:
      - 1) Class Two Quality Standard. See Section 01 6200.

- a) Ramco Finishing Cement 1200.
- e. Weather Barrier Mastic:
  - 1) Water based vinyl-acrylic mastic coating.
  - 2) Class Two Quality Standard. See Section 01 6200.
    - a) Childers / Foster CP-10 / CP-11.
- f. PVC jacket.
- 2. Refrigeration Piping System:
  - a. Thickness:

Pipe Size, Outside Diameter	Insulation Thickness
One inch and smaller	1/2 Inch
1-1/8 to 2 inch	3/4 Inch

- 1) One inch sheet for fittings as recommended by Manufacturer.
- 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a) AP Armaflex 25/50 by Armacell.
  - b) Nitrolite by Nitron Industries. White only for exterior.
  - c) Nomaco K-Flex.
- b. Joint Sealer:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Armacell 520 by Armacell.
    - b) Namaco K-Flex R-373.
- c. Insulation Tape:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Armaflex AP Insul Tape by Armacell.
    - b) FT182 Tape by Nitron Industries.
    - c) Elastomeric Foamtape by Nomac K-Flex.
- d. Exterior Finish:
  - 1) For application to non-white, exterior insulation.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) WB Armaflex Finish by Armacell.
    - b) R-374 Protective Coating by Nomaco K-Flex.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- A. Before application of insulating materials, brush clean surfaces to be insulated and make free from rust, scale, grease, dirt, moisture, and any other deleterious materials.
- B. Use drop cloths over equipment and structure to prevent adhesives and other materials spotting the work.

**3.2 INSTALLATION**

- A. Steam Heating System:
  - 1. Pipes:
    - a. Butt joints firmly together.
    - b. Seal vapor barrier longitudinal seam overlap with vapor barrier adhesive.
    - c. Wrap butt joints with 4 inch strip of vapor barrier jacket material cemented with vapor barrier adhesive.
    - d. Finish with bands applied at mid-section and at each end of insulation.
  - 2. Valves And Fittings:
    - a. Insulate by one of following methods:
      - 1) With hydraulic setting insulating cement, or equal, to thickness equal to adjoining pipe insulation.

- 2) With segments of molded pipe insulation securely wired in place.
  - b. Finish fittings and valves with canvas coated with weather barrier mastic or securely fitted Zeston covers.
  3. Pipe Hangers: Provide shields at each pipe hanger to protect pipe insulation from crushing.
- B. Refrigeration System Piping System:
1. General:
    - a. Install insulation in snug contact with pipe.
      - 1) Insulate flexible pipe connectors.
      - 2) Insulate liquid line upstream of thermal expansion valves with insulating tape.
      - 3) Insulate fittings with sheet insulation and as recommended by Manufacturer.
    - b. Slip insulation on tubing before tubing sections and fittings are assembled keeping slitting of insulation to a minimum.
    - c. Do not install insulation on lines through clamp assembly of pipe support. Butt insulation up against sides of clamp assembly.
    - d. Stagger joints on layered insulation. Seal joints in insulation.
    - e. Install insulation exposed outside building so 'slit' joint seams are placed on bottom of pipe.
    - f. Paint exterior exposed, non-white insulation with two coats of specified exterior finish.
  2. System Requirements:
    - a. Condensing Units: Install insulation on above ground refrigerant suction piping and fittings, including thermal bulb and liquid line upstream of thermal expansion valve.

### 3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work:
1. Method of installing insulation shall be subject to approval of Architect. Sloppy or unworkmanlike installations are not acceptable.

### 3.4 CLEANING

- A. Leave premises thoroughly clean and free from insulating debris.

### 3.5 PROTECTION

- A. Protect insulation wherever leak from valve stem or other source might drip on insulated surface, with aluminum cover or shield rolled up at edges and sufficiently large in area and of shape that dripping will not splash on surrounding insulation.

**END OF SECTION**

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**SECTION 23 0933****ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC****PART 1 - GENERAL****1.1 SUMMARY**

## A. Includes But Not Limited To:

1. Furnish and install automatic temperature control system as described in Contract Documents.
2. Furnish and install conductors and make connections to control devices, motors, and associated equipment.
3. Assist in air test and balance procedure.

## B. Related Requirements:

1. Section 01 4546: Duct testing, adjusting, and balancing of ductwork.
2. Section 23 0501: Common HVAC Requirements.
3. Section 23 3300: Furnishing and installing of temperature control dampers.
4. Division 26:
  - a. Furnishing and installing of raceway, conduit, and junction boxes, including pull wires, for temperature control system except as noted above.
  - b. Power wiring to magnetic starters, disconnect switches, and motors.
  - c. Motor starters and disconnect switches, unless integral with packaged equipment.

**1.2 SUBMITTALS**

## A. Action Submittals:

1. Product Data:
  - a. Installer to provide product literature or cut sheets for all products specified in Project.
  - b. Installer to provide questions of control equipment locations to Mechanical Engineer prior to installation.

## B. Informational Submittals:

1. Certificates:
  - a. Installer must provide 'Certificate of Sponsorship' signed from Approved Distributor with bid confirming Installer sponsorship.

## C. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
  - a. Operations and Maintenance Data:
    - 1) Leave with O&M Manual specified in Section 23 0501.
  - b. Record Documentation:
    - 1) Installer's 'Certificate of Sponsorship'.

**1.3 QUALITY ASSURANCE**

## A. Qualifications: Requirements of Section 01 4301 applies, but is not limited to the following:

1. Installer:
  - a. Before bidding, obtain sponsorship from a local, Approved Distributor specified under PART 2 PRODUCTS of this specification. Initial requirements for sponsorship are:
    - 1) Receive LCBS Connect product training from Approved Distributor.
    - 2) Installer to provide Distributor sponsorship by submitting 'Certificate of Sponsorship' as Informational Submittal with bid. Certificate available as Attachment in this Specification.

**PART 2 - PRODUCTS****2.1 SYSTEMS****A. Manufacturers:**

1. Manufacturer Contact List:
  - a. Honeywell Inc, Minneapolis, MN [www.honeywell.com](http://www.honeywell.com).
    - 1) Primary Contact: Chris Brinkerhoff, (801) 550-3344, [chris.brinkerhoff@honeywell.com](mailto:chris.brinkerhoff@honeywell.com).
  - b. Insul\_Guard, Salt Lake City, UT:
    - 1) Primary Contact: Dan Craner, (801) 518-3733, [insul\\_guard@comcast.net](mailto:insul_guard@comcast.net).
  - c. System Sensor, St Charles, IL [www.systemsensor.com](http://www.systemsensor.com).
  - d. Zimmerman Technologies, Renton, WA:
    - 1) Primary Contact: Tracy Zimmerman, (425) 255-1906, [zimmtech@yahoo.com](mailto:zimmtech@yahoo.com).

**B. Distributors: Obtain LCBS Connect control devices, RP panels, sensors, actuators and other control equipment from following Sponsoring Approved Distributors. See Section 01 4301:**

1. Utah:
  - a. Control Equipment Co: (800) 452-1457 [rhowe@controlequiputah.com](mailto:rhowe@controlequiputah.com) Ray Howe.
  - b. Building Controls & Solutions: (801) 214-3313 [Kathy.Wright@building-controls.com](mailto:Kathy.Wright@building-controls.com) Kathy Wright.

**C. Performance:**

1. Design Criteria:
  - a. Honeywell LCBS Connect control system with cloud based gateway:
    - 1) General Requirements:
      - a) Controls multistage equipment, dehumidification and ventilation with 2 wire connection to controller interface location in occupied space.
      - b) Adjustable backlight to controller interface module from 15%-100%en after 30 seconds of setting adjustments.
      - c) System controllers can be programmed from the interface module or from the cloud service.
      - d) LCBS Connect controller utilizes echelon communication network with the controller located near the mechanical equipment and the system interface located in the occupied space.
      - e) System shall control outdoor ventilation air based upon system occupancy of electric / electronic actuation of dampers.
      - f) CO2 (Carbon Dioxide) sensors will open ventilation dampers only when CO2 exceeds 1000 ppm.
      - g) LCBS Connect devices access via internet Chrome browser via gateway.
      - h) Wired room temperature sensors may be added as specified.
    - 2) System Requirements:
      - a) Up to 3 Heat/2 Cool Heat Pumps; Up to 3 Heat/2 Cool Conventional Systems.
      - b) Tri-Lingual display (Selectable for English, Spanish, or French).
      - c) 18 to 30 Vac.
      - d) 50 Hz; 60 Hz.
      - e) System switch to include Auto changeover for Heat-Cool.
      - f) 7-Day Programming.
      - g) 365-Day Event Scheduling.
      - h) Display Security Lockout options.
      - i) Minimum/ Maximum Temperature Range Stops.
      - j) Configurable over-ride option.
      - k) Remote Access via internet.
      - l) Dehumidification setting range 40 to 80% RH.

**D. Components:**

1. Controller, Wall Module:
  - a. Controller and Display Kit:
    - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - a) Part Number Honeywell YCRL6438SR1000 consisting of following:



- (1) Unitary Controller: Honeywell CRL6438SR1000
    - (2) Wall Module: Honeywell TS120
    - b) Wall Cover Plate: Honeywell. 50002883-001.
    - c) Discharge Air / Return Air Sensors: Honeywell C7041B2005 20k ohms.
    - d) Outdoor Air Sensor: Honeywell C7041F2006.
    - e) Indoor Air Sensor: Sylk bus network; Honeywell TR40
    - f) Averaging sensor: Sylk bus network; Honeywell TR40
  - b. Internet Gateway Module(s): One (1) module per thirty (30) controllers.
    - 1) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - a) LCBS Connect Gateway Module: Honeywell LGW1000.
- 2. Sealant Compound:
  - a. Description:
    - 1) Non hardening waterproof, vapor proof, self-adhesive for hot or cold application for sealing conduit openings against drafts, dust moisture and noise.
  - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) Duct Seal Compound No. DS-130 by Gardner Bender, Menomonee Falls , WI.  
[www.gardnerbender.com](http://www.gardnerbender.com).
    - 2) Thumb-Tite Sealing Compound No. 4216-92 by Nu-Calgon, St. Louis, MO  
[www.nucalgon.com](http://www.nucalgon.com).
- 3. Guard For Cultural Center Sensors:
  - a. Match color of sensor.
  - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) MSI-244 controller guard with integral wood base by Zimmerman Technologies.
    - 2) WMG 1 controller guard by Insul\_Guard.
- 4. Duct Smoke Detectors:
  - a. Duct mounted smoke detector in systems with airflow greater than 2000 CFM.
  - b. Intelligent low flow photoelectric duct smoke detector with flash scan.
  - c. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) System Sensor Model D4120.
- 5. Transformer:
  - a. 120 / 24 V, 50VA Honeywell AT150F.
  - b. 120 / 24 V, 75VA Honeywell AT175F.
- 6. Damper Actuators:
  - a. Electric type equipped for Class I wiring.
  - b. Shall not consume power during UNOCCUPIED cycle or use chemicals or expandable media.
  - c. Have built in spring return.
  - d. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) Honeywell MS8105A1030/U.
- 7. Conductors:
  - a. Color-coded and No. 16 and No. 12 AWG Type TWN, TFN, or THHN, stranded.
  - b. Thermostat Cable: 12, 8, or 4 conductor, 18AWG solid copper wire, insulated with high-density polyethylene. Conductors parallel enclosed in brown PVC jacket (22 AWG cable not allowed).
  - c. Echelon Network Ebus Communicating Cable:
    - 1) Class Two Quality Standard. See Section 01 6200:
      - a) CAT 4, 22 gauge (0.025 in), twisted pair, non-plenum and non-shielded cable.
- 8. UC Panels For Chapel & CC System:
  - a. 16-ga screw cover, painted sheet metal. Box with cover and knockouts, pre-wired terminal strips, relay, and transformer.
  - b. Provide Labels with Distributor contact information on each panel.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Custom UC panel w/mod heat and air econ.
- 9. CO<sub>2</sub> (Carbon Dioxide) Return Air Sensor:
  - a. Duct mount with display.
  - b. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) Honeywell: C7232B1006.

- E. Operation Sequences:
1. Programmable controller shall control Unoccupied and Occupied status of fan system based on adjustable seven-day program. Fan shall run continuously in Occupied Mode and cycle in Unoccupied Mode.
  2. Adjustable heating and cooling set points shall control space temperature by activating either heating or cooling equipment. Programmable thermostat provides automatic change over between heating and cooling.
  3. Controller provides optional override by allowing timed override of program by pushing override on controller touch screen. This shall activate controller to Occupied Mode and system shall control to Occupied set point.
  4. Minimum outdoor ventilation air damper, spring return type, shall open in controller Occupied Mode and remain closed in Unoccupied Mode.
  5. Systems with CO<sub>2</sub> (Carbon Dioxide) sensor to control minimum, spring return type, outdoor ventilation air damper:
    - a. Damper shall open in controller Occupied Mode only when CO<sub>2</sub> sensor setpoint of 1000 ppm is reached. Damper shall close if CO<sub>2</sub> level drops below 900 ppm.
    - b. Damper shall remain closed in controller Unoccupied Mode.

## **PART 3 - EXECUTION**

### **3.1 INSTALLERS**

- A. Acceptable Installers. See Section 01 4301:
1. Meet Quality Assurance Qualifications as specified in Part 1 of this specification.

### **3.2 INSTALLATION**

- A. Interface With Other Work:
1. Calibrate room controllers as required during air test and balance. Insulate sensor J-box with fiberglass insulation; expandable/ foam insulation is NOT acceptable.
  2. Instruct air test and balance personnel in proper use and setting of control system components.
  3. Install low voltage electrical wiring in accordance with Division 26 of these Specifications.
- B. Echelon Communication: Ebus
1. Ebus cable needs to be installed at least 12 inches from lighting, motors, or low voltage switching cables.
- C. Safety Controls:
1. Fresh air dampers shall close on fan shut-down, power failure, open fan motor disconnect switch, and when thermostat is in UNOCCUPIED mode.
- D. Mount damper actuators and actuator linkages external of airflow. Make certain dampers operate freely without binding or with actuator housing moving.

### **3.3 FIELD QUALITY CONTROL**

- A. Field Tests:
1. Calibrate, adjust, and set controls for proper operation, operate systems, and be prepared to prove operation of any part of control system. This work is to be completed before pre-substantial completion inspection.
  2. Test each individual heating, cooling, and damper control for proper operation using control system.

### 3.4 SYSTEM STARTUP

- A. For systems with LCBS Controller.
1. Contractor is responsible for a fully functioning control system accessible via internet web browser. Contractor is responsible to coordinate Network start up with assistance from local IT technician. Local IT technician shall provide available ports on network switch for LCBS gateway.
  2. Contractor is responsible configuring all controllers with proper zone names, zone scheduling, proper Church conference / holiday scheduling, all to be coordinated with local FM manager. Set proper clock setting including day/month/year.
  3. Set Heating / Cooling to proper stages
  4. Set heat cycle rates to 9 cph and cooling to 4 cph.
  5. Set DO1 relay to "Occupancy".
  6. Set System switch operation to "Automatic" changeover.
  7. Set fan switch operation to "ON".
  8. Set minimum UnOcc start time for all days. No days shall be scheduled Unconfigured.
  9. Set Occupied start times to match meeting start times; provided by local FM manager.
  10. Place all zone over-ride durations to one (1) hour except for Bishop and Stake area which shall be set to two (2) hours.
  11. Set Occupied default heating setpoints to 70 degrees, cooling setpoints to 74 degrees.
  12. Set Unoccupied default heating setpoint to 60 degrees, cooling setpoints to 90 degrees.
  13. Set each zone to applicable Holiday scheduling for General & Stake Conferences.

### 3.5 ADJUSTING

- A. LCBS controller configuration settings; the following are configuration guidelines for consistent installations:

1. Temperature Units Fahrenheit/ Celsius
2. Equipment Type Conventional/heat pump.
  - a. Stages of Heat 1,2
  - b. Stages of Cool 1,2
  - c. Fan operation in heat mode Enable Fan w/ Heat
3. Equipment Options
  - a. Leave at Default
  - b. Heating Cycles per Hour 6-9 cph
  - c. Cooling Cycles per Hour 3-4 cph
4. Recovery
  - a. Leave at Default
5. Economizer / DLC
  - a. Configure as required by control equipment.
6. Sensor Selection
  - a. Set according to averaging sensors
  - b. Set to multi sensor "Smart" when averaging.
  - c. Set Occupancy Sensor to "Disable".
7. Terminal Assignment
  - a. Set according to equipment
  - b. Set Terminal DO1 to Occupancy to control fresh air damper based upon scheduled occupancy or over-ride.
8. Dehumidification
  - a. Leave at default
  - b. See Accessory Loops
9. Miscellaneous
  - a. Leave at default
10. Sensor setting
  - a. Leave at default
  - b. Set as Required
11. Accessory Loops – Set as required
  - a. Hot water valve
  - b. Dehumidification
  - c. Other

12. Configure Zone Name (display on Home Screen).
13. Set Password to ABCD.
14. Set Occupied Setpoint
15. Set Unoccupied Setpoint
16. Set Schedule
17. MENU/ Holiday-Event Scheduler / Custom Events/ Create new event.
  - a. Eastern Time Zone:
    - 1) First Sunday in April: Occupied Chapel from 11:30 am – 6:00 pm / every year.
    - 2) First Sunday in April: Unoccupied all other zones for all day / every year.
    - 3) First Sunday in October: Occupied Chapel from 11:30 am – 6:00 pm / every year.
    - 4) First Sunday in October: Unoccupied all other zones for all day / every year.
  - b. Central Time Zone:
    - 1) First Sunday in April: Occupied Chapel from 10:30 am – 5:00 pm / every year.
    - 2) First Sunday in April: Unoccupied all other zones for all day / every year.
    - 3) First Sunday in October: Occupied Chapel from 10:30 am – 5:00 pm / every year.
    - 4) First Sunday in October: Unoccupied all other zones for all day / every year.
  - c. Mountain Time Zone:
    - 1) First Sunday in April: Unoccupied all zones for all day / every year.
    - 2) First Sunday in April: Unoccupied all zones for all day / every year.
    - 3) First Sunday in October: Unoccupied all zones for all day / every year.
    - 4) First Sunday in October: Unoccupied all zones for all day / every year.
  - d. Pacific Time Zone:
    - 1) First Sunday in April: Occupied Chapel from 8:30 am – 3:00 pm / every year.
    - 2) First Sunday in April: Unoccupied all other zones for all day / every year.
    - 3) First Sunday in October: Occupied Chapel from 8:30 am – 3:00 pm / every year.
    - 4) First Sunday in October: Unoccupied all other zones for all day / every year.

### 3.6 CLOSEOUT ACTIVITIES

- A. Instruction Of Owner:
  1. Include as part of training required in Section 23 0501, following training:
    - a. Training shall be by personnel of installing company and utilize operator's manuals and as-built documentation.
    - b. Provide training in (2) two sessions including LCBS Connect sight & smart Apps for up to six (6) hours total:
      - 1) First session will occur between system completion and Substantial Completion.
      - 2) Second session will occur within forty-five (45) days of Substantial Completion when agreed upon by Owner.
    - c. Training shall include sequence of operation review, selection of displays, modification of schedules and setpoints, troubleshooting of sensors, etc, as follows:
      - 1) Control System Overview:
        - a) Show access to system through both individual controllers and Internet browser and how network works. Scheduling building at minimum for Stake and General Conference, special events.
      - 2) Controller Programming from Keypad: Instructions on developing setpoints and schedules and adjusting local zone temperatures.
      - 3) Web Internet training with local Facilities Manager during two (2) sessions.
        - a) Review all features accessible from the 'Settings' tab including Alarm points, user access, scheduling and humidity setpoints (where applied).

**END OF SECTION**

**ATTACHMENTS**

<b>CERTIFICATE OF SPONSORSHIP</b> <b>Electric and Electronic Control System for HVAC Installer</b>	
<b>PROJECT INFORMATION</b> (To be filled out by Installer - available from project specification):	
Project Name:	_____
Project Number:	_____
Project Address:	_____
<b>INSTALLER INFORMATION</b> (To be filled out by Installer):	
Installer Name:	_____
Installer Firm:	_____
Installer Address:	_____
<p>I acknowledge and confirm the above listed Installer has received training and exhibit LCBSConnect System skills and is qualified to install the automation control system as specified for Project identified above. Our company will stand behind the Installer meeting the legal specified performance requirements.</p>	
Sponsoring Approved Honeywell Distributor Name: _____	
Signature: _____	Printed Signature: _____
Date: _____	



**SECTION 23 1123****FACILITY LIQUIFIED PETROLEUM GAS (LPG) PIPING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install gas piping and fittings at exterior and within building as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 0501: 'Common HVAC Requirements'.
  - 2. Section 23 0553: 'Identification for HVAC Piping and Equipment'.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A53/A53M-12, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'.
    - b. ASTM A234/A234M-11a, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service'.
  - 2. International Code Council (ICC):
    - a. ICC IFGC-2015: 'International Fuel Gas Code'.

**1.3 QUALITY ASSURANCE**

- A. Regulatory Agency Sustainability Approvals:
  - 1. Conform to requirements of IFGC International Fuel Gas Code.
  - 2. Viega MegaPressG fittings:
    - a. Conform to requirements of Canadian Standards Association CSA B149.1 and to requirements of IFGC International Fuel Gas Code.

**PART 2 - PRODUCTS****2.1 SYSTEM**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. BrassCraft, Novi, MI [www.brasscraft.com](http://www.brasscraft.com).
    - b. Cimberio Valve Co Inc, Malvern, PA [www.cimberio.com](http://www.cimberio.com).
    - c. ConBraCo Industries, Inc, Matthews, NC [www.conbraco.com](http://www.conbraco.com) or ConBraCo / Honeywell Ltd, Scarborough, ON (416) 293-8111.
    - d. Dormont Manufacturing Company, Export, PA [www.dormont.com](http://www.dormont.com).
    - e. Jenkins-NH-Canada, Brantford, ON [www.jenkins-nh-canada.com](http://www.jenkins-nh-canada.com).
    - f. Jomar International, Madison Heights, MI [www.jomar.com](http://www.jomar.com).
    - g. California Valves (formally KOSO) by Pacific Seismic Products Inc, Lancaster, CA, Distributed by Strand Earthquake Consultants [www.strandearthquake.net](http://www.strandearthquake.net).
    - h. Viega MegaPressG, Wichita, KS [www.viega-na.com](http://www.viega-na.com).

- i. Watts Regulator Co, North Andover, MA [www.wattsreg.com](http://www.wattsreg.com) or Watts Industries (Canada) Inc, Burlington, ON (888) 208-8927.
- B. Materials:
1. Above-Ground Pipe:
    - a. Black carbon steel, butt welded, Schedule 40 pipe meeting requirements of A53/A53M.
  2. Above-Ground Pipe Fittings:
    - a. Welded forged steel fittings meeting requirements of ASTM A234/A234M.
    - b. Standard weight malleable iron screwed.
    - c. Viega MegaPressG fittings.
  3. Valves:
    - a. 125 psi (862 kPa) bronze body ball valve, UL listed.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) CIM 102.1 by Cimbrio Valve.
      - 2) Apollo Series 80-100 by ConBraCo.
      - 3) 'Red Cap' R602 by Jenkins NH Canada.
      - 4) Model T-204 by Jomar International.
      - 5) Model B-6000-UL by Watts Regulator.
  4. Flexible Connector:
    - a. Type 304 stainless steel corrugated tube coated for corrosion protection.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) Dormont Supr-Safe.
      - 2) BrassCraft Procoat.
  5. Seismic Valves:
    - a. LPG seismic shut-off valves.
      - 1) Rate at maximum 20 psi (138 kPa) pressure with positive seating from minus 40 deg F to plus 150 deg F (minus 40 deg C to plus 66 deg C) for exterior mounting near gas meter.
      - 2) UL listed valve, factory set for IBC Seismic Design Category D, E, or F.
      - 3) Size to be determined by total cu ft (0.028 cu m) per hour gas flow requirement of building and following conditions: 0.1 inch (2.54 mm) water column maximum allowable pressure-drop through valve with available pressure of 4 oz (113 grams).
      - 4) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
        - a) California Seismic Gas Shutoff Valve (formally KOSO):
          - (1) Horizontal installation: Model 302.
          - (2) Vertical installation with bottom inlet: Model VB302.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Steel pipe installed through air plenums, in walls:
  1. Pipes 2-1/2 inches (64 mm) and larger shall have welded fittings and joints.
  2. Other steel pipe may have screwed or welded fittings.
  3. Viega MegaPressG:
    - a. Install MegaPressG fittings according to Manufacture's recommendations and with Manufacture's recommended tools.
- B. On lines serving gas-fired equipment, install gas valves adjacent to equipment outside of equipment cabinet and easily accessible.
- C. Install 6 inch (150 mm) long minimum dirt leg, with pipe cap, on vertical gas drop serving each gas-fired equipment unit.
- D. Use fittings for changes of direction in pipe and for branch runouts.



- E. Visible gas piping inside building shall be painted yellow and labeled.
- F. Install seismic valve in 24 inch(610 mm) long pipe section anchored to building wall at each end.

### 3.2 FIELD QUALITY CONTROL

- A. Field tests:
  - 1. Subject all portions of LPG piping system, in sections or in entirety, to air pressure of 75 psig (0.52 MPa) and prove airtight for four (4) hours.
  - 2. Disconnect equipment not suitable for 75 psig (0.52 MPa) pressure from piping system during test period.

**END OF SECTION**

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**SECTION 23 2213****STEAM AND STEAM CONDENSATE PIPING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install steam and condensate piping and specialties as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 0501: Common HVAC Requirements.
  - 2. Section 23 0719: HVAC Piping Insulation.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. ASTM International
    - a. ASTM A53/A53M-07, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'.
    - b. ASTM A234/A234-10, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service'.

**1.3 SUBMITTALS**

- A. Informational Submittals:
  - 1. Certificates:
    - a. Following completion of cleaning, submit certificate signed by Water Treatment Consultant confirming cleaning operations to Architect for approval before use of cleaned system.

**PART 2 - PRODUCTS****2.1 SYSTEM**

- A. Manufacturers:
  - 1. Manufacturer List:
    - a. Armstrong International, Three Rivers, MI [www.armstrong-intl.com](http://www.armstrong-intl.com).
    - b. Barnes & Jones Inc, Randolph, MA [www.barnesandjones.com](http://www.barnesandjones.com).
    - c. ConBraCo Industries Inc, Matthews, NC [www.conbraco.com](http://www.conbraco.com) or ConBraCo / Honeywell Ltd, Scarborough, ON (416) 293-8111.
    - d. Federal Pump Corp, Brooklyn, NY [www.abcelectriccorp.com/federalpump](http://www.abcelectriccorp.com/federalpump).
    - e. Hammond Valve Co, New Berlin, WI [www.hammondvalve.com](http://www.hammondvalve.com).
    - f. Mepco, Grand Rapids, MI [www.mepcollc.com](http://www.mepcollc.com) or Mepco / EFI Systems Group, Etobicoke, ON (616) 246-1431.
    - g. Nibco Inc, Elkhart, IN [www.nibco.com](http://www.nibco.com).
    - h. Roth Pump Co, Rock Island, IL [www.rothpump.com](http://www.rothpump.com).
    - i. Shipco Pumps, Shippensburg, PA [www.shipcopumps.com](http://www.shipcopumps.com).
    - j. Skidmore, Benton Harbor, MI [www.skidmorepump.com](http://www.skidmorepump.com).

- k. Spirax - Sarco, Blythewood, SC [www.spiraxsarco.com/us/](http://www.spiraxsarco.com/us/) or Spirax Sarco Canada Ltd, Concord, ON (905) 660-5510.
  - l. Watts Regulator Co, North Andover, MA [www.wattsreg.com](http://www.wattsreg.com) or Watts Industries (Canada) Inc, Burlington, ON (888) 208-8927.
- B. Materials:
- 1. Piping:
    - a. Piping over 2-1/2 inches shall be welded with full weld fittings.
    - b. Supply Piping:
      - 1) Schedule 40 black carbon steel pipe meeting requirements of ASTM A53/A53M, Type E or F.
      - 2) Fittings shall be standard weight 150 lb malleable iron screwed pattern up to 2-1/2 inches.
    - c. Condensate Piping:
      - 1) Schedule 80 black steel pipe meeting requirements of ASTM A53/A53M, Type E or F.
    - d. Fittings shall be standard weight 300 lbs malleable iron screwed pattern up to 2-1/2 inches.
  - 2. Manual Steam Radiator / Gate Valves:
    - a. Heavy red brass with stuffing box glands or followers.
    - b. Rough bodies.
    - c. Finished trimmings.
    - d. Nickel-plated.
    - e. Designed to permit repacking when wide open and under pressure.
    - f. Fitted with renewable discs.
    - g. Provided with large composition non-breakable hand wheels.
    - h. Ball joint union connections.
    - i. Suitable for steam working pressure of 25 psi.
    - j. Straightway, offset, or corner angle pattern as dictated at Project.
    - k. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.
      - 1) Armstrong.
      - 2) Barnes & Jones Inc.
      - 3) Mepco.
  - 3. Drip Traps And Steam Coil Traps:
    - a. Combination float and thermostatic type. Thermostatic element shall form automatic air vent and conform to applicable requirements of thermostatic radiator traps.
    - b. Main trap body, float, and valve mechanism shall be capable of withstanding constant steam pressure of 15 psi.
    - c. Traps shall delivery rated capacity called for on Drawings at 1/2 pound differential pressure.
    - d. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
      - 1) Armstrong.
      - 2) Barnes & Jones Inc.
      - 3) Mepco.
      - 4) Spirax / Sarco.
  - 4. Thermostatic Traps:
    - a. Rugged brass construction with union inlet.
    - b. Duplex phosphor bronze diaphragm.
    - c. Stainless steel valve cone and seat.
    - d. Diaphragms and seats both replaceable.
    - e. Rated for 25 psig to 25 inches vacuum.
    - f. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
      - 1) Armstrong.
      - 2) Barnes & Jones Inc.
      - 3) Mepco.
      - 4) Spirax / Sarco.
  - 5. Valves:
    - a. Cutoff Service: Three-piece, full port, bronze ball valves rated at 400 psig WOG and 150 psig saturated steam.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
      - 1) ConBraCo Apollo 82-100 Series.
      - 2) Hammond Series 8600.

- 3) Nibco Series 595.
- 4) Watts Series B-6800.
6. Self-Contained Thermostatic Steam Radiator Valves:
  - a. Nickel-plated brass construction with a fully replaceable packing gland.
  - b. Designed to permit gland replacement when wide open and under pressure.
  - c. Thermostatic radiator valve shall maintain room temperature within +/- 1 degree F..
  - d. Bellows type operator with either a liquid or vapor charge. Operator shall be capable of temperature adjustment between 45 degrees and 86 degrees F.
  - e. Valve disc shall be constructed of EPDM capable of withstanding 250 degree F. temperatures.
  - f. Operator shall connect to the valve using a fast-on mounting system and secured by an Allen screw.
  - g. Straightway, offset, or corner pattern as dictated at Project.
  - h. Approved Manufacturers:
    - 1) Danfoss RA2000.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Piping:
  1. Ream out pipe ends and remove burrs before making up into fittings. Use graphite and oil applied to male threads only in making pipe joint fittings.
  2. Install unions where necessary and on both sides of equipment and drip traps.
  3. Start main piping runs as high as possible.
    - a. Keep as close to ceiling as possible.
    - b. Make sufficient allowance for grade downward and for branches to be taken off top at 45 degree angles.
  4. Grade steam and return mains downward in direction of flow one inch in 20 feet. Grade runouts and branches that grade against flow of steam at 1/4 inch per foot.
  5. Install float and thermostatic drip traps in sizes shown on Drawings.
    - a. Install at ends and on raises of steam mains.
    - b. Install dirt strainer and gate valve ahead of each drip trap.
- B. Specialties:
  1. Install check valve and ball valve on pump discharge.
  2. Run vent line from receivers and terminate as high as possible with return bends.
  3. Use eccentric reducers where changes in pipe sizes occur in steam mains. Locate reducers approximately 18 inches beyond branch from steam main causing reduction.

### **3.2 FIELD QUALITY CONTROL**

- A. Field Tests:
  1. When directed by Architect, conduct operating test on any piece of equipment to demonstrate its capacity and operating characteristics.
- B. Field Inspections:
  1. Do not cover or conceal piping system until tested at 50 psi in excess of maximum working pressure, 100 psi minimum, and inspected and approved by Architect and local inspector having jurisdiction.

### 3.3 CLEANING

- A. Thoroughly clean equipment, piping, and other material provided under this Section. Remove rust, scale, and other dirt before painting or covering and before operating system.
- B. Operate heating system at 10 psi for 6 hours minimum, then:
  - 1. Fill boiler to top with water to wash film, oil, and grease over top.
  - 2. Drain boiler and refill to proper level with fresh water.
  - 3. Use one pound tri-sodium phosphate for every 100 gallons of water during cleaning operation.
- C. Chemical Cleaning of Steam And Condensate System Piping:
  - 1. Give Architect seven days written notice of date of cleaning procedures. Perform initial cleaning of piping systems under supervision of local representative of chemical treatment supplier.
  - 2. Steam And Condensate Piping System:
    - a. After it has been determined system is tight and has been flushed, add cleaner at rate of 13 oz of cleaner per gallon of water and operate boiler and system for 24 hours. Return condensate to drain.
    - b. After 24 hour period listed above, clean traps and strainers.

**END OF SECTION**

**SECTION 23 2214****STEAM AND STEAM CONDENSATE SPECIALTIES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install steam and condensate specialties described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 0501: Common HVAC Requirements.

**PART 2 - PRODUCTS****2.1 ACCESSORIES**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Armstrong, Three Rivers, MI [www.armstronginternational.com](http://www.armstronginternational.com).
    - b. Barnes & Jones Inc, Randolph, MA [www.barnesandjones.com](http://www.barnesandjones.com).
    - c. Hoffman Controls Corp, Dallas, TX [www.hoffmanspecialty.com](http://www.hoffmanspecialty.com).
    - d. Spirax Sarco Inc, Allentown, PA [www.spiraxsarco.com/us/](http://www.spiraxsarco.com/us/).
- B. Materials
  - 1. Float And Thermostatic Traps:
    - a. Suitable for 100 psig steam working pressure. Install in ends of steam mains, at points where steam main rises, and at all other points where shown or required for proper operation of system.
    - b. Materials shall be as follows:
      - 1) Float: Copper alloy.
      - 2) Float Valve And Seat: Monel metal or stainless steel.
      - 3) Body: Renewable gray cast-iron, covers removable without disturbing piping connections.
    - c. Capacities of traps shall be with 5 psig pressure at trap inlet and differential pressure across trap of 2 psig unless otherwise noted.
    - d. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
      - 1) Armstrong: Series A.
      - 2) Barnes & Jones: FT-2175.
      - 3) Hoffman: FT015C.
      - 4) Spirax / Sarco: Model FTI-125.

**PART 3 - EXECUTION: Not Used****END OF SECTION**

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**SECTION 23 2300****REFRIGERANT PIPING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install piping and specialties for refrigeration systems as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 0501: 'Common HVAC Requirements'.
  - 2. Section 23 0719: 'Refrigerant Piping Insulation'.
  - 3. Section 23 6213: 'Compressor Units: Air Conditioning (5 Ton or less)'.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. Federal Emergency Management Agency (FEMA) / Vibration Isolation and Seismic Control Manufacturers Association (VISCMA) / American Society of Civil Engineers (ASCE):
    - a. FEMA 412, 'Installing Seismic Restraints For Mechanical Equipment' (December 2002).
  - 2. Vibration Isolation and Seismic Control Manufacturers Association (VISCMA):
    - a. VISCMA 101-15, 'Seismic Restraint Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.
    - b. VISCMA 102-12, 'Vibration Isolation Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.
- B. Definitions:
  - 1. Refrigerant: Absorbs heat by a change of state (evaporation) from liquid to a gas, and releases heat by a change of state (condenses) from gas back to a liquid.
  - 2. Vibration Isolation: Vibration reduction in which an isolation system is placed between the source of unwanted vibration and an item which needs to be shielded from the vibration.
- C. Reference Standards:
  - 1. American National Standards Institute (ANSI) / American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
    - a. ANSI/ASHRAE 15-2016 and 34-2016, 'Safety Standard and Designation and Classification of Refrigerants'.
  - 2. American National Standards Institute / American Welding Society:
    - a. ANSI/AWS A5.8M/A5.8-2011, 'Specification for Filler Metals for Brazing and Braze Welding'.
  - 3. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
    - a. 2011 ASHRAE Handbook - HVAC Applications.
      - 1) Chapter 48, 'Noise and Vibration Control'.
  - 4. ASTM International:
    - a. ASTM A36/A36M-14, 'Standard Specification for Carbon Structural Steel'.
    - b. ASTM B280-18, 'Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service'.
  - 5. National Fire Protection Association / American National Standards Institute:
    - a. NFPA 90A: 'Installation of Air-Conditioning and Ventilating Systems' (2018 or most recent edition adopted by AHJ).
  - 6. Underwriters Laboratories:
    - a. UL 2182, 'Refrigerants' (April 2006).

### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings: Show each individual equipment and piping support.
- B. Informational Submittals:
  - 1. Qualification Statements: Technician certificate for use of HFC and HCFC refrigerants.
  - 2. Test Reports: Submit to Architect within seven days of testing.

### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Refrigerants:
    - a. Underwriters Laboratories:
      - 1) Comply with requirements of UL 2182.
- B. Qualifications. Section 01 4301 applies, but is not limited to the following:
  - 1. Installer: Refrigerant piping shall be installed by refrigeration contractor licensed by State and by technicians certified in use of HFC and HCFC refrigerants.

## PART 2 - PRODUCTS

### 2.1 COMPONENTS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Airtec, Fall River, MA, [www.noventcaps.com](http://www.noventcaps.com).
    - b. Cooper Industries, Houston, TX [www.cooperindustries.com](http://www.cooperindustries.com).
    - c. Cush-A-Clamp by ZSI Manufacturing, Canton, MI [www.cushaclamp.com](http://www.cushaclamp.com).
    - d. Elkhart Products Corp, Elkhart, IN [www.elkhartproducts.com](http://www.elkhartproducts.com).
    - e. Emerson Climate Technologies, St Louis, MO [www.emersonflowcontrols.com](http://www.emersonflowcontrols.com).
    - f. Handy & Harman Products Division, Fairfield, CT [www.handy-1.com](http://www.handy-1.com).
    - g. Harris Products Group, Cincinnati, OH [www.harrisproductsgroup.com](http://www.harrisproductsgroup.com).
    - h. Henry Valve Co, Melrose Park, IL [www.henrytech.com](http://www.henrytech.com).
    - i. Hilti Inc, Tulsa, OK [www.hilti.com](http://www.hilti.com).
    - j. Hydra-Zorb Co, Auburn Hills, MI [www.hydra-zorb.com](http://www.hydra-zorb.com).
    - k. JB Industries, Aurora, IL [www.jbind.com](http://www.jbind.com).
    - l. Mueller Steam Specialty, St Pauls, NC [www.muellersteam.com](http://www.muellersteam.com).
    - m. Nibco Inc, Elkhart, IN [www.nibco.com](http://www.nibco.com).
    - n. Parker Corp, Cleveland, OH [www.parker.com](http://www.parker.com).
    - o. Sporlan Valve Co, Washington, MO [www.sporlan.com](http://www.sporlan.com). (also ZoomLock)
    - p. Sherwood Valves, Washington, PA [www.sherwoodvalve.com](http://www.sherwoodvalve.com).
    - q. Thomas & Betts, Memphis, TN [www.superstrut.com](http://www.superstrut.com).
    - r. Unistrut, Div of Atkore International, Inc., Harvey, IL [www.unistrut.com](http://www.unistrut.com).
- B. Materials:
  - 1. Refrigerant Piping:
    - a. Meet requirements of ASTM B280, hard drawn straight lengths. Soft copper tubing not permitted.
    - b. Do not use pre-charged refrigerant lines.
  - 2. Refrigerant Fittings:
    - a. Wrought copper with long radius elbows.
    - b. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
      - 1) Mueller Streamline.
      - 2) Nibco Inc.
      - 3) Elkhart.

- 4) Sporlan - ZoomLock [Flame-Free Refrigerant Fittings]
3. Suction Line Traps:
  - a. Manufactured standard one-piece traps.
  - b. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - 1) Mueller Streamline.
    - 2) Nibco Inc.
    - 3) Elkhart.
    - 4) Sporlan - ZoomLock [Flame-Free Refrigerant Fittings]
4. Tee Access:
  - a. Brass:
    - 1) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
      - a) JB Industries: Part #A3 Series with Factory Cap and Valve Core.
5. Connection Material:
  - a. Sporlan - ZoomLock Flame-Free Refrigerant Fittings with factory approved tools.
  - b. Brazing Rods in accordance with ANSI/AWS A5.8M/A5.8:
    - 1) Copper to Copper Connections:
      - a) Classification BCuP-4 Copper Phosphorus (6 percent silver).
      - b) Classification BCuP-5 Copper Phosphorus (15 percent silver).
    - 2) Copper to Brass or Copper to Steel Connections: Classification BAg-5 Silver (45 percent silver).
    - 3) Do not use rods containing Cadmium.
  - c. Flux:
    - 1) Type Two Acceptable Products:
      - a) Stay-Silv White Brazing Flux by Harris Products Group.
      - b) High quality silver solder flux by Handy & Harmon.
      - c) Equal as approved by Architect before use. See Section 01 6200.
6. Valves:
  - a. Manual Refrigerant Shut-Off Valves:
    - 1) Ball valves designed for refrigeration service and full line size.
    - 2) Valve shall have cap seals.
    - 3) Valves with hand wheels are not acceptable.
    - 4) Provide service valve on each liquid and suction line at compressor.
    - 5) If service valves come as integral part of condensing unit, additional service valves shall not be required.
    - 6) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
      - a) Henry.
      - b) Mueller.
      - c) Sherwood.
      - d) Virginia.
7. Filter-Drier:
  - a. On lines smaller than 3/4 inch outside diameter, filter-drier shall be sealed type with brazed end connections.
  - b. Size shall be full line size.
  - c. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
    - 1) Emerson Climate Technologies.
    - 2) Mueller.
    - 3) Parker.
    - 4) Sporlan.
    - 5) Virginia.
8. Sight Glass:
  - a. Combination moisture and liquid indicator with protection cap.
  - b. Sight glass shall be full line size.
  - c. Sight glass connections and sight glass body shall be solid copper or brass, no copper-coated steel sight glasses allowed.
  - d. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) HMI by Emerson Climate Technologies.
9. Liquid Line Solenoid Valve:
  - a. As recommended by equipment manufacturer for long line applications.

10. Refrigerant Piping Supports:
  - a. Base, Angles, And Uprights: Steel meeting requirements of ASTM A36.
  - b. Securing Channels:
    - 1) At Free-Standing Pipe Support:
      - a) Class One Quality Standard: P-1000 channels by Unistrut.
      - b) Acceptable Manufacturers: Hilti, Thomas & Betts.
      - c) Equal as approved by Architect before installation. See Section 01 6200.
    - 2) At Wall Support:
      - a) Class One Quality Standard: P-3300 channels by Unistrut.
      - b) Acceptable Manufacturers: Hilti, Thomas & Betts.
      - c) Equal as approved by Architect before installation. See Section 01 6200.
    - 3) At Suspended Support:
      - a) Class One Quality Standard: P-1001 channels by Unistrut.
      - b) Acceptable Manufacturers: Hilti, Thomas & Betts.
      - c) Equal as approved by Architect before installation. See Section 01 6200.
    - 4) Angle Fittings:
      - a) Class One Quality Standard: P-2626 90 degree angle by Unistrut.
      - b) Acceptable Manufacturers: Hilti, Thomas & Betts.
      - c) Equal as approved by Architect before installation. See Section 01 6200.
  - c. Pipe Clamps:
    - 1) Type Two Acceptable Manufacturers:
      - a) Hydra-Zorb.
      - b) ZSI Cush-A-Clamp.
      - c) Hilti Cush-A-Clamp.
      - d) Equal as approved by Architect before installation. See Section 01 6200.
  - d. Protective Cover: 18 ga steel, hot-dipped galvanized.
11. Locking Refrigerant Cap:
  - a. Provide and install on charging valves:
    - 1) Class One Quality Standard: 'No Vent' locking refrigerant cap.
    - 2) Acceptable Manufacturers: Airtec.
    - 3) Equal as approved by Architect before installation. See Section 01 6200.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Refrigerant Lines:
  1. Install as high in upper mechanical areas as possible. Do not install underground or in tunnels.
  2. Slope suction lines down toward compressor one inch/10 feet. Locate traps at vertical rises against flow in suction lines.
  3. Comply with condensing unit manufacturer's installation instructions.
- B. Connections:
  1. Refrigeration system connections shall be copper-to-copper, copper-to-brass, or copper-to-steel type properly cleaned and brazed with specified rods. Use flux only where necessary. No soft solder (tin, lead, antimony) connections will be allowed in system.
  2. Braze manual refrigerant shut-off valve, sight glass, and flexible connections.
  3. Circulate dry nitrogen through tubes being brazed to eliminate formation of copper oxide during brazing operation.
- C. Specialties:
  1. Install valves and specialties in accessible locations. Install refrigeration distributors and suction outlet at same end of coil.
  2. Install thermostatic bulb as close to cooling coil as possible. Do not install on vertical lines.
  3. Install equalizing line in straight section of suction line, downstream of and reasonably close to thermostatic bulb. Do not install on vertical lines.
  4. Provide liquid line solenoid valve when required for long line applications.

- D. Refrigerant Supports:
1. Support Spacing:
    - a. Piping 1-1/4 inch And Larger: 8 feet on center maximum.
    - b. Piping 1-1/8 inch And Smaller: 6 feet on center maximum.
    - c. Support each elbow.
  2. Isolate pipe from supports and clamps with Hydrozorb or Cush-A-Clamp systems.
  3. Run protective cover continuous from condensing units to risers or penetrations at building wall. Support entire cover utilizing exterior supports as detailed.
  4. Provide opening through exterior cover with removable plug or cover to observe site glass.

### 3.2 FIELD QUALITY CONTROL

- A. Field Tests:
1. Make evacuation and leak tests after completing refrigeration piping systems. Positive pressure test will not suffice for procedure outlined below. Submit test reports.
    - a. Draw vacuum on each entire system with two stage vacuum pump. Draw vacuum to 300 microns using micron vacuum gauge capable of reading from atmosphere to 10 microns. Do not use cooling compressor to evacuate system nor operate it while system is under high vacuum.
    - b. Break vacuum with nitrogen and re-establish vacuum test. Vacuum shall hold for 30 minutes at 300 microns without vacuum pump running.
    - c. Conduct tests at 70 deg F ambient temperature minimum.
    - d. Do not run systems until above tests have been made and systems started up as specified. Inform Owner's Representative of status of systems at time of final inspection and schedule start-up and testing if prevented by outdoor conditions before this time.
    - e. After testing, fully charge system with refrigerant and conduct test with Halide Leak Detector.
    - f. Recover all refrigerant in accordance with applicable codes. Do not allow any refrigerant to escape to atmosphere.
- B. Non-Conforming Work:
1. If it is observed that refrigerant lines are being or have been brazed without proper circulation of nitrogen through lines, all refrigerant lines installed up to that point in time shall be removed and replaced at no additional cost to Owner.

**END OF SECTION**



**SECTION 23 2600**  
**CONDENSATE DRAIN PIPING**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Related Requirements:
1. Section 23 0501: 'Common HVAC Requirements'.

**1.2 REFERENCES**

- A. Reference Standards:
1. ASTM International:
    - a. ASTM B88-09, 'Standard Specification for Seamless Copper Water Tube'.
    - b. ASTM D1785 - 06 'Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.'

**PART 2 - PRODUCTS****2.1 SYSTEMS**

- A. Materials:
1. Condensate Drains:
    - a. 3 inch **75 mm** deep seal, vented water trap adjacent to cooling coil connection.
    - b. Schedule 40 PVC for condensate drains from furnace combustion chambers and furnace cooling coils.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Condensate Drains:
1. Support piping and protect from damage.
  2. Do not combine PVC condensate drain piping from furnace combustion chamber with copper condensate drain piping from cooling coil.

**END OF SECTION**

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**SECTION 23 3001****COMMON DUCT REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. General procedures and requirements for ductwork.
  - 2. Repair leaks in ductwork, as identified by duct testing, at no additional cost to Owner.
- B. Related Requirements:
  - 1. Section 01 4546: 'Duct Testing, Adjusting, and Balancing' for ductwork.
  - 2. Section 07 9219: 'Acoustical Joint Sealants' for quality of acoustic sealant.
  - 3. Section 23 0501: 'Common HVAC Requirements'.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. Sheet Metal And Air Conditioning Contractors' National Association / American National Standards Institute:
    - a. SMACNA, 'HVAC Duct Construction Standards - Metal and Flexible' (Third Edition).

**PART 2 - PRODUCTS****2.1 ASSEMBLIES**

- A. Performance:
  - 1. Design Criteria:
    - a. Standard Ducts: Construction details not specifically called out in Contract Documents shall conform to applicable requirements of SMACNA, 'HVAC Duct Construction Standards Metal and Flexible'.
- B. Materials:
  - 1. Duct Hangers:
    - a. One inch (25 mm) by 18 ga (1.27 mm) galvanized steel straps or steel rods as shown on Drawings, and spaced not more than 96 inches (2 400 mm) apart. Do not use wire hangers.
    - b. Attaching screws at trusses shall be 2 inch (50 mm) No. 10 round head wood screws. Nails not allowed.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. During installation, protect open ends of ducts by covering with plastic sheet tied in place to prevent entrance of debris and dirt.
- B. Make necessary allowances and provisions in installation of sheet metal ducts for structural conditions of building. Revisions in layout and configuration may be allowed, with prior written approval of Architect. Maintain required airflows in suggesting revisions.

- C. Hangers And Supports:
1. Install pair of hangers as required by spacing indicated in table on Drawings.
  2. Install upper ends of hanger securely to floor or roof construction above by method shown on Drawings.
  3. Attach strap hangers to ducts with cadmium-plated screws. Use of pop rivets or other means will not be accepted.
  4. Where hangers are secured to forms before concrete slabs are poured, cut off flush all nails, strap ends, and other projections after forms are removed.
  5. Secure vertical ducts passing through floors by extending bracing angles to rest firmly on floors without loose blocking or shimming. Support vertical ducts, which do not pass through floors, by using bands bolted to walls, columns, etc. Size, spacing, and method of attachment to vertical ducts shall be same as specified for hanger bands on horizontal ducts.

### 3.2 CLEANING

- A. Clean interior of duct systems before final completion.

**END OF SECTION**

**SECTION 23 3114****LOW-PRESSURE METAL DUCTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install above-grade low-pressure steel ducts and related items as described in Contract Documents.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Duct smoke detectors.
- C. Related Requirements:
  - 1. Section 01 4546: 'Duct Testing, Adjusting, And Balancing' for duct test, balance, and adjust air duct systems services provided by Owner.
  - 2. Section 23 3001: 'Common Duct Requirements'.

**1.2 REFERENCES**

- A. Association Publications:
  - 1. Sheet Metal And Air Conditioning Contractors' National Association / American National Standards Institute:
  - 2. SMACNA, 'HVAC Duct Construction Standards - Metal and Flexible' (Third Edition).
- B. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A653/A653M-13, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - b. ASTM E84-14, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
  - 2. Underwriters Laboratories, Inc.:
    - a. UL 723: 'Standard for Safety Test for Surface Burning Characteristics of Building Materials'; (2010 - Tenth Edition).

**1.3 QUALITY ASSURANCE**

- A. Regulatory Agency Sustainability Approvals:
  - 1. Duct Sealer:
    - a. Meet Class A flame spread rating in accordance with ASTM E84 or UL 723.
    - b. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Storage and Handling Requirements:
  - 1. Duct Sealer:
    - a. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).
    - b. Handle to prevent inclusion of foreign matter, damage by water, or breakage.

- c. Store in a cool dry location, but never under 35 deg F (1.7 deg C) or subjected to sustained temperatures exceeding 110 deg F (43 deg C) or as per Manufacturer's written recommendations.
- d. Do use sealants that have exceeded shelf life of product.

## 1.5 FIELD CONDITIONS

### A. Ambient Conditions:

1. Duct Sealer:
  - a. Do not apply under 35 deg F (1.7 deg C) or subjected to sustained temperatures exceeding 110 deg F (43 deg C) or as per Manufacturer's written recommendations.
  - b. Do not apply when rain or freezing temperatures will occur within seventy two (72) hours.

## PART 2 - PRODUCTS

### 2.1 SYSTEM

#### A. Materials:

1. Sheet Metal:
  - a. Fabricate ducts, plenum chambers and casings of zinc-coated, lock-forming quality steel sheets meeting requirements A653/A653M, with G 60 coating.
2. Duct Sealer For Interior Ducts:
  - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Duct Butter or ButterTak by Cain Manufacturing Co Inc, Pelham, AL [www.cainmfg.com](http://www.cainmfg.com).
    - 2) DP 1010 by Design Polymerics, Fountain Valley, CA [www.designpoly.com](http://www.designpoly.com).
    - 3) PROseal, FIBERseal, EVERseal, or EZ-seal by Ductmate Industries, Inc., Charleroi, PA [www.ductmate.com](http://www.ductmate.com).
    - 4) SAS by Duro Dyne, Bay Shore, NY or Duro Dyne Canada, Lachine, QB [www.durodyne.com](http://www.durodyne.com).
    - 5) Iron Grip 601 by Hardcast Inc, Wylie, TX [www.hardcast.com](http://www.hardcast.com).
    - 6) MTS100 or MTS 200 by Hercules Mighty Tough, Denver CO, [www.herculesindustries.com](http://www.herculesindustries.com).
    - 7) 15-325 by Miracle / Kingco, Div ITW TACC, Rockland, MA [www.taccint.com](http://www.taccint.com).
    - 8) 44-39 by Mon-Eco Industries Inc, East Brunswick, NJ [www.mon-ecoindustries.com](http://www.mon-ecoindustries.com).
    - 9) Airseal Zero by Polymer Adhesive Sealant Systems Inc, Weatherford, TX [www.polymeradhesives.com](http://www.polymeradhesives.com).
    - 10) Airseal #22 Water Base Duct Sealer by Polymer Adhesive Sealant Systems Inc, Weatherford, TX [www.polymeradhesives.com](http://www.polymeradhesives.com).

#### B. Fabrication:

1. General:
  - a. Straight and smooth on inside with joints neatly finished.
  - b. Duct drops to diffusers shall be round, square, or rectangular to accommodate diffuser neck. Drops shall be same gauge as branch duct. Seal joints air tight.
2. Standard Ducts:
  - a. General:
    - 1) Ducts shall be large enough to accommodate inside acoustic duct liner. Dimensions shown on Drawings are net clear inside dimensions after duct liner has been installed.
  - b. Rectangular Duct:
    - 1) Duct panels through 48 inch (1 200 mm) dimension having acoustic duct liner need not be cross-broken or beaded. Cross-break unlined ducts, duct panels larger than 48 inch (1 200 mm) vertical and horizontal sheet metal barriers, duct offsets, and elbows, or bead 12 inches (300 mm) on center.
      - a) Apply cross-breaking to sheet metal between standing seams or reinforcing angles.

- b) Center of cross-break shall be of required height to assure surfaces being rigid.
- c) Internally line square and rectangular drops. Externally insulate round drops.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Metal duct surface must be clean and free of moisture, contamination and foreign matter before applying duct sealer for interior and exterior ducts.

#### **3.2 INSTALLATION**

- A. Install internal ends of slip joints in direction of flow. Seal transverse and longitudinal joints air tight using specified duct sealer as per Manufacturer's written instructions. Cover horizontal and longitudinal joints on exterior ducts with two layers of specified tape installed with specified adhesive.
- B. Securely anchor ducts and plenums to building structure with specified duct hangers attached with screws. Do not hang more than one duct from a duct hanger. Brace and install ducts so they shall be free of vibration under all conditions of operation.
- C. Ducts shall not bear on top of structural members.
- D. Paint ductwork visible through registers, grilles, and diffusers flat black.
- E. Properly flash where ducts protrude above roof.
- F. Under no conditions will pipes, rods, or wires be allowed to penetrate ducts.

#### **3.3 FIELD QUALITY CONTROL**

- A. Field Tests:
  - 1. Air Test and Balance Testing as specified in Section 01 4546: 'Duct Testing, Adjusting, and Balancing'.
- B. Non-Conforming Work:
  - 1. Reseal transverse joint duct leaks and seal longitudinal duct joint leaks discovered during air test and balance procedures at no additional cost to Owner.

**END OF SECTION**

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**SECTION 23 3300****AIR DUCT ACCESSORIES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install duct accessories in specified ductwork as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 0933: 'Electric And Electronic Control System For HVAC' for temperature control damper actuators and actuator linkages.
  - 2. Section 23 3001: 'Common Duct Requirements'.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM A653/A653M-15, 'Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process'.
    - b. ASTM C1071-12, 'Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)'.
    - c. ASTM C1338-14, 'Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings'.

**PART 2 - PRODUCTS****2.1 ACCESSORIES**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. AGM Industries, Brockton, MA [www.agmind.com](http://www.agmind.com).
    - b. Air Balance Inc, Holland, OH [www.airbalance.com](http://www.airbalance.com).
    - c. Air-Rite Manufacturing, Bountiful, UT (801) 295-2529.
    - d. American Warming & Ventilating, Holland, OH [www.american-warming.com](http://www.american-warming.com).
    - e. Arrow United Industries, Wyalusing, PA [www.arrowunited.com](http://www.arrowunited.com).
    - f. Cain Manufacturing Company Inc, Pelham, AL [www.cainmfg.com](http://www.cainmfg.com).
    - g. C & S Air Products, Fort Worth, TX [www.csairproducts.com](http://www.csairproducts.com).
    - h. CertainTeed Corp, Valley Forge, PA [www.certainteed.com](http://www.certainteed.com).
    - i. Cesco Products, Florence, KY [www.cescoproducts.com](http://www.cescoproducts.com).
    - j. Design Polymerics, Fountain Valley, CA [www.designpoly.com](http://www.designpoly.com).
    - k. Ductmate Industries Inc, East Charleroi, PA [www.ductmate.com](http://www.ductmate.com).
    - l. Duro Dyne, Bay Shore, NY [www.durodyne.com](http://www.durodyne.com).
    - m. Dyn Air Inc. Lachine, QB [www.dynair.ca](http://www.dynair.ca)
    - n. Elgen Manufacturing Company, Inc. East Rutherford, NJ [www.elgenmfg.com](http://www.elgenmfg.com)
    - o. Flexmaster USA Inc, Houston, TX [www.flexmasterusa.com](http://www.flexmasterusa.com).
    - p. Greenheck Corp, Schofield, WI [www.greenheck.com](http://www.greenheck.com).
    - q. Gripnail Corp, East Providence, RI [www.gripnail.com](http://www.gripnail.com).
    - r. Hardcast Inc, Wylie, TX [www.hardcast.com](http://www.hardcast.com).
    - s. Hercules Industries, Denver, CO, [www.herculesindustries.com](http://www.herculesindustries.com).
    - t. Honeywell Inc, Minneapolis, MN [www.honeywell.com](http://www.honeywell.com).

- u. Johns-Manville, Denver, CO [www.jm.com](http://www.jm.com).
- v. Kees Inc, Elkhart Lake, WI [www.kees.com](http://www.kees.com).
- w. Knauf Fiber Glass, Shelbyville, IN [www.knauffiberglass.com](http://www.knauffiberglass.com).
- x. Manson Insulation Inc, Brossard, QB [www.isolationmanson.com](http://www.isolationmanson.com).
- y. Metco Inc, Salt Lake City, UT (801) 467-1572 [www.metcospiral.com](http://www.metcospiral.com).
- z. Miracle / Kingco, Rockland, MA [www.taccint.com](http://www.taccint.com).
- aa. Mon-Eco Industries Inc, East Brunswick, NJ [www.mon-ecoindustries.com](http://www.mon-ecoindustries.com).
- bb. Nailor Industries Inc, Houston, TX [www.nailor.com](http://www.nailor.com).
- cc. Owens Corning, Toledo, OH [www.owenscorning.com](http://www.owenscorning.com).
- dd. Polymer Adhesive Sealant Systems Inc, Irving, TX [www.polymeradhesives.com](http://www.polymeradhesives.com).
- ee. Pottorff Company, Fort Worth, TX [www.pottorff.com](http://www.pottorff.com).
- ff. Ruskin Manufacturing, Kansas City, MO [www.ruskin.com](http://www.ruskin.com).
- gg. Sheet Metal Connectors Inc, Minneapolis, MN [www.smconnectors.com](http://www.smconnectors.com).
- hh. Tamco, Stittsville, ON [www.tamco.ca](http://www.tamco.ca).
- ii. Techno Adhesive, Cincinnati, OH [www.technoadhesives.com](http://www.technoadhesives.com).
- jj. McGill AirSeal, Columbus, OH [www.mcgillairseal.com](http://www.mcgillairseal.com).
- kk. United Enertech Corp, Chattanooga, TN [www.unitedenertech.com](http://www.unitedenertech.com).
- ll. Utemp Inc, Salt Lake City, UT (801) 978-9265.
- mm. Ventfabrics Inc, Chicago, IL [www.ventfabrics.com](http://www.ventfabrics.com).
- nn. Ward Industries, Grand Rapids MI [www.wardind.com](http://www.wardind.com).
- oo. Young Regulator Co, Cleveland, OH [www.youngregulator.com](http://www.youngregulator.com).

B. Materials:

1. Acoustical Liner System:

a. Duct Liner:

- 1) One inch thick, 1-1/2 lb density fiberglass conforming to requirements of ASTM C1071. Liner will not support microbial growth when tested in accordance with ASTM C1338.
- 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - a) ToughGard by CertainTeed.
  - b) Duct Liner E-M by Knauf Fiber Glass.
  - c) Akousti-Liner by Manson Insulation.
  - d) Quiet R by Owens Corning.
  - e) Linacoustic RC by Johns-Manville.

b. Adhesive:

- 1) Category Four Approved Water-Based Products. See Section 01 6200 for definitions of Categories:
  - a) Cain: Hydrotak.
  - b) Design Polymerics: DP2501 or DP2502 (CMCL-2501).
  - c) Duro Dyne: WSA.
  - d) Elgen: A-410-WB.
  - e) Hardcast: Coil-Tack.
  - f) Hercules: Mighty Tough Adhesives MTA500 or MTA600.
  - g) Miracle / Kingco: PF-101.
  - h) Mon-Eco: 22-67 or 22-76.
  - i) Polymer Adhesive: Glasstack #35.
  - j) Techno Adhesive: 133.
  - k) McGill AirSeal: Uni-tack.
- 2) Category Four Approved Solvent-Based (non-flammable) Products. See Section 01 6200 for definitions of Categories:
  - a) Cain: Safetak.
  - b) Duro Dyne: FPG.
  - c) Hardcast: Glas-Grip 648-NFSE.
  - d) Miracle / Kingco: PF-91.
  - e) Mon-Eco: 22-24.
  - f) Polymer Adhesive: Q-Tack.
  - g) Techno Adhesive: 'Non-Flam' 106.
- 3) Category Four Approved Solvent-Based (flammable) Products. See Section 01 6200 for definitions of Categories:
  - a) Cain: HV200.



- b) Duro Dyne: MPG.
- c) Hardcast: Glas-Grip 636-SE.
- d) Miracle / Kingco: PF-96.
- e) Mon-Eco: 22-22.
- f) Polymer Adhesive: R-Tack.
- g) Techno Adhesive: 'Flammable' 106.
- c. Fasteners:
  - 1) Adhesively secured fasteners not allowed.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) AGM Industries: 'DynaPoint' Series RP-9 pin.
    - b) Cain.
    - c) Duro Dyne.
    - d) Gripnail: May be used if each nail is installed by 'Grip Nail Air Hammer' or by 'Automatic Fastener Equipment' in accordance with Manufacturer's recommendations.
- 2. Flexible Equipment Connections:
  - a. 30 oz closely woven UL approved glass fabric, double coated with neoprene.
  - b. Fire retardant, waterproof, air-tight, resistant to acids and grease, and withstand constant temperatures of 200 deg F.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Cain: N-100.
    - 2) Duro Dyne: MFN.
    - 3) Dyn Air: CPN with G-90 galvanized off-set seam.
    - 4) Elgen: ZLN / SDN.
    - 5) Ventfabrics: Ventglas.
    - 6) Ductmate: ProFlex.
- 3. Duct Access Doors:
  - a. General:
    - 1) Factory built insulated access door with hinges and sash locks, as necessary. Construction shall be galvanized sheet metal, 24 ga minimum.
    - 2) Fire and smoke damper access doors shall have minimum clear opening of 12 inches square or larger as shown on Drawings.
  - b. Rectangular Ducts:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Air Balance: Fire/Seal FSA 100.
      - b) Air-Rite: Model HAD-2.
      - c) Cesco: HDD.
      - d) Elgen: TAB Type / Hinge and Cam.
      - e) Flexmaster: Spin Door.
      - f) Kees: ADH-D.
      - g) Nailor: 08SH.
      - h) Pottorff: 60-HAD.
      - i) Ruskin: ADH-24.
      - j) United Enertech: L-95.
  - c. Round Ducts:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Ductmate: 'Sandwich' Access Door.
      - b) Elgen: Sandwich Access Door.
      - c) Kees: ADL-R.
      - d) Nailor: 0890.
      - e) Pottorff: RAD.
      - f) Ruskin: ADR.
      - g) Ward: DSA.
- 4. Dampers And Damper Accessories:
  - a. Locking Quadrant Damper Regulators:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Duro Dyne: KS-385.
      - b) Dyn Air: QPS-385.
      - c) Elgen: EQR-4.
      - d) Ventfabrics: Ventline 555.

- e) Young: No. 1.
- b. Concealed Ceiling Damper Regulators:
  - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Cain.
    - b) Duro Dyne.
    - c) Elgen.
    - d) Metco Inc.
    - e) Ventfabrics: 666 Ventlok.
    - f) Young: 301.
- c. Volume Dampers:
  - 1) Rectangular Duct:
    - a) Factory-manufactured 16 ga galvanized steel, single blade and opposed blade type with 3/8 inch axles and end bearings. Blade width 8 inches maximum. Blades shall have 1/8 inch clearance all around.
    - b) Damper shall operate within acoustical duct liner.
    - c) Provide channel spacer equal to thickness of duct liner.
    - d) Dampers above removable ceiling and in Mechanical Rooms shall have locking quadrant on bottom or side of duct. Otherwise, furnish with concealed ceiling damper regulator and cover plate.
    - e) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) Air-Rite: Model CD-2.
      - (2) American Warming: VC-2-AA.
      - (3) Arrow: OBDAF-207.
      - (4) C & S: AC40.
      - (5) Cesco: AGO.
      - (6) Daniel: CD-OB.
      - (7) Greenheck: VCD-20.
      - (8) Nailor: 1810 or 1820.
      - (9) Pottorff: CD-42.
      - (10) Ruskin: MD-35.
      - (11) United Enertech: MD-115.
      - (12) Utemp: CD-OB.
  - 2) Round Duct:
    - a) Factory-manufactured 20 ga galvanized steel, single blade with 3/8 inch axles and end bearings.
    - b) For use in outside air ducts.
    - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) Air Balance: Model AC-22.
      - (2) Air-Rite: Model CD-8.
      - (3) American Warming: V-22.
      - (4) Arrow: Type-70.
      - (5) C & S: AC21R.
      - (6) Cesco: MGG.
      - (7) Nailor: 1890.
      - (8) Pottorff: CD-21R.
      - (9) Ruskin: MDRS-25.
      - (10) United Enertech: RD.
- d. Motorized Outside Air Dampers:
  - 1) General:
    - a) Low leakage type. AMCA certified.
    - b) Make provision for damper actuators and actuator linkages to be mounted external of air flow.
  - 2) Rectangular Ducts:
    - a) Damper Blades:
      - (1) Steel or aluminum airfoil type with mechanically locked blade seals, 8 inch blade width maximum measured perpendicular to axis of damper.
      - (2) Jamb seals shall be flexible metal compression type.
      - (3) Opposed or single blade type.

- b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) Air Balance: AC 526.
        - (2) American Warming: AC526.
        - (3) Arrow: AFD-20.
        - (4) C & S: AC50.
        - (5) Cesco: AGO3.
        - (6) Nailor: 2020.
        - (7) Pottorff: CD-52.
        - (8) Ruskin: CD-60.
        - (9) Tamco: Series 1000.
        - (10) United Enertech: CD-150 or CD-160.
- 3) Round Ducts:
  - a) Damper Blades:
    - (1) Steel with mechanically locked blade seals.
    - (2) Blade seals shall be neoprene or polyethylene.
    - (3) Single blade type.
  - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - (1) Air Balance: AC 25.
    - (2) American Warming: VC25.
    - (3) Arrow: Type 70 or 75.
    - (4) C & S: AC25R.
    - (5) Cesco: AGG.
    - (6) Nailor: 1090.
    - (7) Pottorff: CD-25R.
    - (8) Ruskin: CD25.
    - (9) Tamco: Square-to-Round Series 1000.
    - (10) United Enertech: RI.
- e. Backdraft Dampers:
  - 1) Backdraft blades shall be nonmetallic neoprene coated fiberglass type.
  - 2) Stop shall be galvanized steel screen or expanded metal, 1/2 inch mesh.
  - 3) Frame shall be galvanized steel or extruded aluminum alloy.
  - 4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Air-Rite: Model BDD-3.
    - b) American Warming: BD-15.
    - c) C & S: BD31.
    - d) Pottorff: BD-51.
    - e) Ruskin: NMS2.
    - f) Utemp: BFEA.

## 5. Air Turns:

- a. Single thickness vanes. Double thickness vanes not acceptable.
- b. 4-1/2 inch wide vane rail. Junior vane rail not acceptable.

## 6. Branch Tap for Flexible Ductwork:

- a. Factory-manufactured rectangular-to-round 45 degree leading tap fabricated of 24 ga zinc-coated lock-forming quality steel sheets meeting requirements of ASTM A653, with G-90 coating.
- b. One inch wide mounting flange with die formed corner clips, pre-punched mounting holes, and adhesive coated gasket.
- c. Manual Volume Damper:
  - 1) Single blade, 22 ga minimum
  - 2) 3/8 inch minimum square rod with brass damper bearings at each end.
  - 3) Heavy-duty locking quadrant on 1-1/2 inch high stand-off mounting bracket attached to side of round duct.
- d. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - 1) ST-1HD (HET) by Air-Rite:
    - a) Nylon damper bearings approved for Air-Rite.
  - 2) STO by Flexmaster.
  - 3) HET by Sheet Metal Connectors.

- C. Fabrication:
1. Duct Liner:
    - a. Install mat finish surface on airstream side. Secure insulation to cleaned sheet metal duct with continuous 100 percent coat of adhesive and with 3/4 inch long mechanical fasteners 12 inches on center maximum unless detailed otherwise on Drawings. Pin all duct liner.
    - b. Accurately cut liner and thoroughly coat ends with adhesive. Butt joints tightly. Top and bottom sections of insulation shall overlap sides. If liner is all one piece, folded corners shall be tight against metal. Ends shall butt tightly together.
    - c. Coat longitudinal and transverse edges of liner with adhesive.
  2. Air Turns:
    - a. Permanently install vanes arranged to permit air to make abrupt turn without appreciable turbulence, in 90 degree elbows of above ground supply and return ductwork.
    - b. Quiet and free from vibration when system is in operation.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Duct Liner:
1. Furnish and install acoustic lining in following types of rectangular ducts unless noted otherwise on Contract Documents:
    - a. Supply air.
    - b. Return air.
    - c. Mixed air.
    - d. Transfer air.
    - e. Elbows, fittings, and diffuser drops greater than 12 inches in length.
  2. Do not install acoustic lining in round ducts.
- B. Flexible Connections: Install flexible inlet and outlet duct connections to each fan coil unit.
- C. Access Doors In Ducts:
1. Install between manual and motorized outside air damper at each system. Locate doors within 6 inches of installed dampers.
  2. Install within 6 inches of fire dampers and in Mechanical Room if possible. Install on side of duct that allows easiest access to damper.
- D. Dampers And Damper Accessories:
1. Install concealed ceiling damper regulators.
    - a. Paint cover plates to match ceiling tile.
    - b. Do not install damper regulators for dampers located directly above removable ceilings or in Mechanical Rooms.
  2. Provide each take-off with an adjustable volume damper to balance that branch.
    - a. Anchor dampers securely to duct.
    - b. Install dampers in main ducts within insulation.
    - c. Dampers in branch ducts shall fit against sheet metal walls, bottom and top of duct, and be securely fastened. Cut duct liner to allow damper to fit against sheet metal.
    - d. Where concealed ceiling damper regulators are installed, provide cover plate.
  3. Install motorized dampers.

**END OF SECTION**

**SECTION 23 3316****FIRE DAMPERS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install fire and smoke dampers described in Contract Documents.
- B. Related Requirements:
  - 1. Section 15 3001: 'Common Duct Requirements'.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. Underwriters Laboratories (UL):
    - a. UL 555: 'Fire Dampers' (7th Edition).
    - b. UL 555C, 'Ceiling Dampers' (3rd Edition).

**1.3 QUALITY ASSURANCE**

- A. Regulatory Agency Sustainability Approvals:
  - 1. Dampers shall conform to NFPA and SMACNA requirements and bear UL label.
  - 2. Dampers shall be approved by fire authorities having jurisdiction where so required.
  - 3. Wall and floor fire dampers shall conform to UL 555 Fire Damper Test Standard.
  - 4. Ceiling fire dampers shall conform to UL 555C Ceiling Damper Test Standard.
  - 5. Smoke Dampers shall conform to UL 555S Leakage Rated Damper Test Standard.
  - 6. Combination fire / smoke dampers shall conform to UL 555 Fire Damper Test Standard and to UL 555S Leakage Rated Damper Test Standard.

**1.4 SUBMITTALS**

- A. Maintenance Material Submittals:
  - 1. Extra Stock Materials:
    - a. Leave six (6) fusible links of each rating type used on Project with Owner.

**PART 2 - PRODUCTS****2.1 ASSEMBLIES**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Air Balance Inc, Holland, OH [www.airbalance.com](http://www.airbalance.com).
    - b. Cesco Products, Florence, KY [www.cescoproducts.com](http://www.cescoproducts.com).
    - c. Greenheck Corp, Schofield, WI [www.greenheck.com](http://www.greenheck.com) or Greenheck Corp/ E H Price Ltd, Winnipeg, MB (204) 669-4220.
    - d. Honeywell Inc, Minneapolis, MN [www.honeywell.com](http://www.honeywell.com).
    - e. Nailor Industries, Houston, TX [www.nailor.com](http://www.nailor.com).
    - f. Pottorff, Fort Worth, TN [www.pottorff-hvac.com](http://www.pottorff-hvac.com).

- g. Prefco Products Inc, Buckingham, PA [www.prefco-hvac.com](http://www.prefco-hvac.com).
  - h. Ruskin Manufacturing, Kansas City, MO [www.ruskin.com](http://www.ruskin.com).
  - i. Safe-Air / Dowco, Cicero, IL [www.safeair-dowco.com](http://www.safeair-dowco.com).
  - j. United Enertech Corp, Chattanooga, TN [www.unitedenertech.com](http://www.unitedenertech.com).
- B. Manufactured Units:
- 1. Fire Dampers:
    - a. Walls And Floors (Type 1):
      - 1) Type 'B.'
      - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) Air Balance: Model 119B.
        - b) Cesco: Model 15SB.
        - c) Greenheck: Model FD150XB.
        - d) Nailor: Model 0120H.
        - e) Pottorff: Model VFD-10.
        - f) Ruskin: Model DIBD20.
        - g) Safe-Air: Model 150B Sleeved.
        - h) United Enertech: FDD-SB.
    - b. Ceilings (Type 2):
      - 1) Radiation type ceiling fire damper.
      - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) Air Balance: Model 289.
        - b) Cesco: Model RCI.
        - c) Greenheck: Model CRD-60B.
        - d) Nailor: Model 0716 or 0722.
        - e) Pottorff: Model CFD-20.
        - f) Ruskin: Model CFD-LDS Series.
        - g) Safe-Air: Model 410A.
        - h) United Enertech: C-S/R.
- C. Fabrication:
- 1. General:
    - a. 16 ga frames.
    - b. Integral sleeves, except for Type 2 Fire Dampers.
  - 2. Type 1 Dampers: Fabricate with blades out of airstream.
- D. Operation Sequences:
- 1. Types 1 And 2: Dampers shall close when temperatures at damper exceed 165 deg F (74 deg C) link unless indicated otherwise on Drawings.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Placement:
- 1. Fire Dampers (Types 1 and 2): Install in ducts where ducts penetrate fire-rated walls and floors and at registers, grilles, and diffusers penetrating fire rated assemblies.

**END OF SECTION**

**SECTION 23 3346****FLEXIBLE DUCTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install supply air branch duct runouts to diffusers as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 3001: Common Duct Requirements.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. National Fire Protection Association / American National Standards Institute:
    - a. NFPA 90A: 'Installation of Air-Conditioning and Ventilating Systems' (2018 or most recent edition adopted by AHJ).
  - 2. Underwriters Laboratories:
    - a. UL 181, 'Factory-Made Ducts and Air Connectors' (11th Edition).
    - b. UL 181B, 'Closure Systems for Use With Flexible Air Ducts and Air Connectors' (3rd Edition).

**PART 2 - PRODUCTS****2.1 SYSTEM**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. JP Lamborn Co., Fresno CA [www.jpflex.com](http://www.jpflex.com).
    - b. Flexmaster USA Inc, Houston, TX [www.flexmasterusa.com](http://www.flexmasterusa.com) or Flexmaster Canada Ltd, Richmond Hill, ON (905) 731-9411.
    - c. Thermaflex by Flexible Technologies, Abbeville, SC or Mississauga, ON [www.thermaflex.net](http://www.thermaflex.net).
- B. Materials:
  - 1. Ducts:
    - a. Formable, flexible, circular duct which shall retain its cross-section, shape, rigidity, and shall not restrict airflow after bending.
    - b. Insulation:
      - 1) Nominal 1-1/2 inches (38 mm), 3/4 lb per cu ft (12 kg per cu m) density fiberglass insulation with air-tight, polyethylene or polyester core, sheathed in seamless vapor barrier jacket factory installed over flexible assembly.
    - c. Assembly, including insulation and vapor barrier, shall meet Class I requirement of NFPA 90A and be UL 181 rated, with flame spread of 25 or less and smoke developed rating of 50 or under.
    - d. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) PR-25 by JP Lambornes.
      - 2) Flex-Vent KP by Thermaflex by Flexible Technologies.
      - 3) Type 1B Insulated by Flexmaster.

2. Cinch Bands: Nylon, 3/8 inch (9.5 mm) removable and reusable type.
  - a. Listed and labeled in accordance with Standard UL 181B and labeled 'UL 181 B-C'.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install duct in fully extended condition free of sags and kinks, using 72 inch (1 800 mm) maximum lengths.
- B. Make duct connections by coating exterior of duct collar for 3 inches (75 mm) with duct sealer and securing duct in place over sheet metal collar with specified cinch bands.

**END OF SECTION**



**SECTION 23 3713****DIFFUSERS, REGISTERS, AND GRILLES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install diffusers, registers, and grilles connected to ductwork as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 3001: 'General Duct Requirements'.

**1.2 SUBMITTALS**

- A. Maintenance Material Submittals:
  - 1. Tools: Leave tool for removing core of each different type of grille for building custodian.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturer Contact List:
  - 1. Carnes Co, Verona, MI [www.carnes.com](http://www.carnes.com).
  - 2. Krueger Air System Components, Richardson, TX [www.krueger-hvac.com](http://www.krueger-hvac.com).
  - 3. Metal\*Aire by Metal Industries Inc, Clearwater, FL [www.metalaire.com](http://www.metalaire.com).
  - 4. Nailor Industries Inc, Houston, TX or Weston, ON [www.nailor.com](http://www.nailor.com).
  - 5. Price Industries Inc, Suwanee, GA [www.price-hvac.com](http://www.price-hvac.com) or E H Price Ltd, Winnipeg, MB (204) 669-4220.
  - 6. Titus, Richardson, TX [www.titus-hvac.com](http://www.titus-hvac.com).
  - 7. Tuttle & Bailey, Richardson, TX [www.tuttleandbailey.com](http://www.tuttleandbailey.com).

**2.2 MANUFACTURED UNITS**

- A. Ceiling Diffusers:
  - 1. Finish: Off-white baked enamel.
  - 2. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Carnes: SKSA.
    - b. Krueger: SH.
    - c. Metal\*Aire: 5500S.
    - d. Nailor: 650OB.
    - e. Price: SMD-6.
    - f. Titus: TDC-6.
    - g. Tuttle & Bailey: M.
- B. Side Wall Supply Grilles And Registers:
  - 1. Finish: Off-white baked enamel.
  - 2. Removable core.
  - 3. Double deflection.
  - 4. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

- a. Krueger: 5815.
  - b. Metal\*Aire: 42C.
  - c. Nailor: 51RCD.
  - d. Price: RCG-DVS.
  - e. Titus: 1707.
  - f. Tuttle & Bailey: AVF.
- C. Floor Supply and Return Grilles:
1. Finish: Clear anodized.
  2. Construction: Aluminum, reinforced for floor use.
  3. Frame: 1 inch flange, mitered corners, spring clip fastening.
  4. Core: Minimum 3/16 inch bars at 1/2" spacing. Support bars @ 6" O.C. Removable retainer clips.
  5. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Carnes: CCJB (with mitered corners welded on face and sanded).
    - b. J & J: 2500 with Frame 10.
    - c. Krueger: 1500F.
    - d. Metal\*Aire: 2000F.
    - e. Nailor: 49-240-FN-MM.
    - f. Price: LBPH-25B.
    - g. Titus: CT-540.
    - h. Tuttle & Bailey: 4000 CO.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Anchor securely into openings. Secure frames to ductwork by using four sheet metal screws, one per side. Level floor registers and anchor securely into floor.

### **3.2 ADJUSTING**

- A. Set sidewall supply register blades at 15 degrees upward deflection.

**END OF SECTION**

**SECTION 23 3714****LOUVERS AND VENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install louvers connected to ductwork as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 3001: 'General Duct Requirements'.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturer Contact List:
  - 1. Airolite Co, Marietta, OH [www.airolite.com](http://www.airolite.com).
  - 2. Air-Rite Manufacturing, Bountiful, UT [www.air-ritemfg.com](http://www.air-ritemfg.com).
  - 3. American Warming & Ventilating, Holland, OH [www.awv.com](http://www.awv.com).
  - 4. Arrow United Industries, Wyalusing, PA [www.arrowunited.com](http://www.arrowunited.com).
  - 5. Carnes Co, Verona, WI [www.carnes.com](http://www.carnes.com) or Energy Technology Products LTD, Edmonton, AB (780) 468-1110.
  - 6. Industrial Louvers Inc, Delano, MN [www.industriallouvers.com](http://www.industriallouvers.com) or DKG Construction, LTD., Waterdown, ON 289-895-9729.
  - 7. Pottorff, Fort Worth, TX [www.pottorff.com](http://www.pottorff.com).
  - 8. Ruskin Manufacturing, Kansas City, MO [www.ruskin.com](http://www.ruskin.com).
  - 9. United Enertech Corporation, Chattanooga, TN [www.unitedenertech.com](http://www.unitedenertech.com).
  - 10. Vent Products Co Inc, Chicago, IL [www.ventprod.com](http://www.ventprod.com).
  - 11. SF435 by Western Ventilation Products Ltd, Calgary, AB [www.westvent.com](http://www.westvent.com).
  - 12. Wonder Metals Corp, Redding, CA [www.wondermetals.com](http://www.wondermetals.com).

**2.2 MANUFACTURED UNITS**

- A. Louvers:
  - 1. General:
    - a. Extruded aluminum, with blades welded or screwed into frames.
    - b. Frames shall have mitered corners.
    - c. Louvers shall be recessed, flanged, stationary, or removable as noted on Contract Documents.
    - d. Finish:
      - 1) Polyvinylidene Fluoride (PVF<sub>2</sub>) Resin-base finish (Kynar 500 or Hylar 5000) containing 70 percent minimum PVF<sub>2</sub> in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
      - 2) Color as selected by Architect from Manufacturer's standard colors.
  - 2. Louvers Connected To Ductwork:
    - a. 1/2 inch (13 mm) mesh 16 ga (1.59 mm) aluminum bird screen.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) K638 by Airolite.
      - 2) LE-1 by Air-Rite Manufacturing.

- 3) LE48 by American Warming & Ventilating.
- 4) EA-405 by Arrow United Industries.
- 5) FKDA by Carnes.
- 6) 455-XP by Industrial Louvers.
- 7) EFK-445 by Pottorff.
- 8) ELF81S30 by Ruskin.
- 9) EL-4 by United Eneritech.
- 10) 2740-31 by Vent Products.
- 11) EX by Wonder Metals.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Anchor securely into openings.
- B. Where louvers touch masonry or dissimilar metals, protect with heavy coat of asphaltum paint.

**END OF SECTION**

**SECTION 23 3723****HVAC GRAVITY VENTILATORS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install roof vents as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 3001: 'Common Duct Requirements'.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturer List:
  - 1. Air-Rite Manufacturing, Bountiful, UT (801) 295-2529.
  - 2. Breidert Air Products, Jacksonville, FL [www.breidert.com](http://www.breidert.com).
  - 3. Carnes Company, Verona, WI [www.carnes.com](http://www.carnes.com).
  - 4. Greenheck Fan Corporation, Schofield, WI [www.greenheck.com](http://www.greenheck.com).
  - 5. Loren Cook Co, Springfield, MO [www.lorencook.com](http://www.lorencook.com).
  - 6. United Enertech Corporation, Chattanooga, TN [www.unitedenertech.com](http://www.unitedenertech.com).
  - 7. Vent Products Co, Inc, Chicago, IL [www.ventprod.com](http://www.ventprod.com).

**2.2 MANUFACTURED UNITS**

- A. Louvered Penthouses:
  - 1. Fabricated from (0.081 inch **2.15 mm**) extruded aluminum.
    - a. All welded construction.
    - b. Screws or rivets will not be allowed.
  - 2. Blades:
    - a. Horizontal at 45 degree angle with return bends at upper edges.
    - b. Welded, mitered corners for continuous blade effect.
  - 3. Bird Screens: 1/2 inch (**13 mm**) square mesh 16 ga (**1.6 mm**) aluminum in extruded aluminum, rewirable frames on interior of louvers.
  - 4. Penthouse Finish: Clear anodized aluminum.
  - 5. Curbs:
    - a. Galvanized steel, insulated, factory-fabricated curb.
    - b. Insulation: Minimum 1-1/2 inches (**38 mm**) thick, 3 lb **48 kg per cubic m** density fiber glass.
    - c. Curb Extension: 8 inches (**200 mm**) above finished roof level.
  - 6. Provide automatic back draft damper on Relief Air Penthouses. Provide motorized damper where indicated on Drawings.
  - 7. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a. Air-Rite Manufacturing: Model LPE-1.
    - b. Breidert: Model RLX.
    - c. Carnes: GLAB.
    - d. Cook: Type TRE.
    - e. Greenheck: WIH/WRH.
    - f. United Enertech: Model PEL-4.
    - g. Vent Products: Model 7100.

**PART 3 - EXECUTION: Not Used**

**END OF SECTION**

## **SECTION 23 4100**

### **AIR FILTERS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install filters used in mechanical equipment.
- B. Related Requirements:
  - 1. Section 23 3001: 'Common Duct Requirements'.

##### **1.2 REFERENCES**

- A. Reference Standard:
  - 1. American National Standards Institute (ANSI) / American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
    - a. ANSI/ASHRAE 52.2-2017, 'Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size'.

#### **PART 2 - PRODUCTS**

##### **2.1 MANUFACTURED UNITS**

- A. Furnace Filters: One inch thick throw-away type as recommended by Furnace Manufacturer.

#### **PART 3 - EXECUTION**

##### **3.1 INSTALLATION**

- A. Provide ample access for filter removal.

##### **3.2 FIELD QUALITY CONTROL**

- A. Inspection: At date of Substantial Completion, air filters shall be new, clean, and approved by Owner's representative.

**END OF SECTION**





**SECTION 23 5135****AIR PIPING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install heating equipment exhaust piping and combustion air intake piping as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 07 6310: 'Steep Slope Roof Flashing: Asphalt Tile' for pipe flashing used on steep slope asphalt tile roofs only.
  - 2. Sections Under 09 9000 Heading: Painting.
  - 3. Section 23 0501: 'Common HVAC Requirements'.
  - 4. Section 23 5417: 'Gas-Fired Furnaces'.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM D1785-12, 'Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120'.
    - b. ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
    - c. ASTM D2661-11, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings'.
    - d. ASTM D2665-14, 'Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings'.

**PART 2 - PRODUCTS****2.1 ASSEMBLIES**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Armaflex by Armacell, Mebane, NC [www.armaflex.com](http://www.armaflex.com).
    - b. Nomaco, Youngsville, NC [www.nomacokflex.com](http://www.nomacokflex.com).
- B. Materials:
  - 1. Air Piping: Schedule 40 pipe and fittings meeting requirements of ASTM D1785, ASTM D2661, or ASTM D2665.
  - 2. Solvent Cement and Adhesive Primer:
    - a. Meet requirements of ASTM F656 for cement primer and ASTM D2564 for pipe cement.
  - 3. Flexible Foamed Pipe Insulation:
    - a. Thickness:
      - 1) 1/2 inch (13 mm) for 2 through 3 inch (50 through 75 mm) outside diameter pipe.
      - 2) 1/2 inch (13 mm) sheet for fittings as recommended by Manufacturer.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) Tubolit by Armaflex.
      - 2) ImcoLock or Therma-Cel by Nomaco K-Flex.

4. Insulation Joint Sealer:
  - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) 520 by Armaflex.
    - 2) R-320 by Nomaco K-Flex.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Installation For Condensing Furnaces:
  1. Run individual vent and individual combustion intake piping from each furnace to concentric roof termination kit provided by Furnace Manufacturer. Slope lines downward toward furnace.
  2. Slope combustion chamber drain downward to funnel drain. Anchor to wall with wall clamps, allowing free movement through clamp for expansion.
  3. Use concentric roof termination kit provided by Furnace Manufacturer. Install vent and combustion air intake piping at clearance and distances required by Furnace Manufacturer.
  4. Attach factory-supplied neoprene coupling to combustion-air inlet connection and secure with clamp.
  5. Ensure that factory-supplied perforated metal disc is installed in flexible coupling, unless its removal is required.
- B. Support:
  1. Support concentric roof termination kit at ceiling or roof line with 20 ga (0.912 mm) sheet metal straps as detailed on Drawings.
  2. Support horizontal and sloping sections of pipe with 1 inch (25 mm) wide 20 ga (1.0058 mm) galvanized steel straps. Anchor securely to structure, not allowing pipe to sway.
- C. Insulation:
  1. General:
    - a. Install insulation in snug contact with pipe and in accordance with Manufacturer's recommendations.
    - b. Slip insulation on piping before piping sections and fittings are assembled keeping slitting of insulation to a minimum.
    - c. Joints:
      - 1) Place 'slit' joint seams of insulation exposed outside building on bottom of pipe.
      - 2) Stagger joints on layered insulation.
      - 3) Seal joints in insulation.
    - d. Paint exterior exposed insulation with two coats of finish recommended by Insulation Manufacturer, color selected by Architect.
  2. Install specified insulation on PVC air piping serving mechanical equipment as follows
    - a. Combustion air PVC piping in truss space and in attic.
    - b. Combustion vent PVC piping in attic, in truss space, and above roof.
    - c. Insulate fittings with sheet insulation and as recommended by Manufacturer.

**END OF SECTION**

**SECTION 23 5417**

**GAS-FIRED FURNACES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install horizontal/vertical gas-fired condensing furnaces as described in Contract Documents.
  
- B. Related Sections:
  - 1. Section 23 0501: 'Common HVAC Requirements'.
  - 2. Section 23 1123: 'Facility Natural Gas Piping'.
  - 3. Section 23 2300: 'Refrigerant Piping'.
  - 4. Section 23 4100: 'Air Filters'.
  - 5. Section 23 5135: 'Air Piping'.
  - 6. Section 23 6214: 'Compressor Units: Air Conditioning (5 Ton or less)' for DX Cooling.

**1.2 SUBMITTALS**

- A. Informational Submittals:
    - 1. Manufacturer Reports: Equipment check-out sheets.
  
  - B. Special Procedure Submittals:
    - 1. Installer must register with Manufacturer before submitting Manufacturer Warranty:
      - a. Installer to contact Owner's Representative (FM Group or Project Manager) for following MANDATORY information to be given to Manufacturer before Manufacturer will issue Manufacturer's 'Special LDS Warranty' included with Closing Submittal:
        - 1) This must be given to Manufacturer:
          - a) Name of Owner (name of FM Group) \_\_\_\_\_
          - b) Mailing Address (FM office address) \_\_\_\_\_
          - c) Building Property ID (unique 7 digit identifier) \_\_\_\_\_
          - d) Project site address: \_\_\_\_\_
          - e) Model Number of each Unit \_\_\_\_\_
          - f) Serial Number of each Unit \_\_\_\_\_
          - g) Date of Installation / Startup \_\_\_\_\_
- 
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Equipment checkout sheet: Complete and sign all items for each unit.

**1.3 WARRANTY**

- A. Manufacturer's Warranty:
  - 1. Provide Manufacturer's 'Special LDS Warranty' for the following:
    - a. Provide fifteen (15) year minimum limited warranty of heat exchanger.
    - b. Provide five (5) year limited warranty on parts.

**PART 2 - PRODUCTS****2.1 ASSEMBLIES**

- A. Manufacturers:
1. Manufacturer Contact List:
    - a. Carrier Corporation:
      - 1) Carrier National: Bradley Brunner (270) 282-1241 [Bradley.M.Brunner@Carrier.utc.com](mailto:Bradley.M.Brunner@Carrier.utc.com).
      - 2) Carrier Utah: Rich Carpenter (Contractors HVAC Supply) (801) 410-6077 e-mail [rcarpent@mtncom.net](mailto:rcarpent@mtncom.net).
    - b. Lennox Industries:
      - 1) For pricing and information contact Lennox National Account @ 1-800-367-6285.
      - 2) Lennox National Contact : Cody Jackson (801) 736-8904 [Cody.Jackson@LennoxInd.com](mailto:Cody.Jackson@LennoxInd.com).
    - c. Trane Company:
      - 1) Salt Lake Trane, attention: Jason Bradford (801) 486-0500 [www.Jason.Bradford@trane.com](mailto:www.Jason.Bradford@trane.com).
    - d. York International:
      - 1) Brian Michael (405) 419-6230 [brian.k.michael@jci.com](mailto:brian.k.michael@jci.com).
- B. Design Criteria:
1. Rated at 92 percent minimum AFUE (Annual Fuel Utilization Efficiency) calculated in accordance with DOE test procedures.
- C. Manufactured Units:
1. Furnaces:
    - a. Factory assembled units certified by AGA complete with blower section, furnace section, steel casing, piped, and wired.
    - b. Blower section shall consist of cabinet, blower, and motor.
      - 1) Cabinet shall be of 22 ga (0.8 mm) minimum cold rolled steel and have finish coat of baked-on enamel.
      - 2) Blower shall be Class 1, full DIDW, statically and dynamically balanced.
    - c. Automatic controls shall consist of:
      - 1) Manual gas shut-off valve.
      - 2) Operating automatic gas valve.
      - 3) Solid-state type fan and thermal limit controls.
      - 4) 24-volt transformer.
      - 5) Hot surface ignition system.
    - d. Blower shall be driven by multi-speed constant torque ECM motor.
    - e. Furnace section shall be enclosed in 22 ga (0.8 mm) minimum enameled steel casing lined with foil covered insulation.
    - f. Heat Exchanger: Aluminized steel.
    - g. Gas Burners: Aluminized steel.
    - h. PVC intake of outside air and PVC combustion product exhaust, with sealed combustion, direct vent system.
    - i. Concentric roof termination kit for roof mounting.
    - j. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) Standard Furnaces:
        - a) Carrier: 59SC5A.
        - b) Lennox: ML195.
        - c) Trane: TUH1.
        - d) York: TG9S.
  2. Cooling Coil:
    - a. Cooling coil shall consist of heavy gauge steel cabinet with baked-on enamel finish to match furnace:
      - 1) Coil shall have aluminum fins bonded to seamless copper or aluminum tubing.
      - 2) Coil shall be ARI rated. Provide drain pans with connections at one end.
      - 3) Use thermal expansion valve.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:

- 1) Vertical:
  - a) Carrier: CNPVP.
  - b) Lennox: CX34.
  - c) Trane: 4TXC.
  - d) York: FC.

## 2.2 ACCESSORIES

- A. Filter Frame:
  1. Build filter frame external to furnace as detailed on Contract Drawings.
- B. Vibration Isolators:
  1. Vertical Installation: 4 inches (100 mm) square by 1/2 inch (13 mm) thick minimum neoprene type vibration isolation pads.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Vibration Isolators:
  1. Install vibration isolator under each corner of vertical furnace.

### 3.2 FIELD QUALITY CONTROL

- A. Manufacturer Services:
  1. Furnace installer shall:
    - a. Verify proper gas orifice size.
    - b. Clock gas meter for rated input.
    - c. Verify and set gas pressure at furnace.
    - d. Check and measure temperature rise.
    - e. Check safety controls for proper operation.
    - f. Check combustion vent sizes and combustion air sizes.
  2. In addition, furnace installer shall start up, check out, and adjust furnaces using equipment check-out sheet provided by Manufacturer. Complete and sign all items on sheet.

**END OF SECTION**

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**SECTION 23 6214****COMPRESSOR UNITS: Air Conditioning (5 Ton or less)****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install compressor units as described in contract documents.
- B. Related Sections:
  - 1. Section 23 0501: 'Common HVAC Requirements'.
  - 2. Section 23 2300: 'Refrigerant Piping'.
  - 3. Section 23 5417: 'Gas-Fired Furnaces'.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Compressor: Pump that increases vapor (refrigerant or air) pressure from one level to a higher level of pressure.
  - 2. Compressor Unit: Outside section of an air conditioning system which pumps vaporized refrigerant from the evaporator, compresses it, liquefies it in the condenser and returns it to the evaporator coil. The outdoor portion of a split system air conditioner contains the compressor and outdoor coil.
  - 3. Condenser: Device used to condense refrigerant in a cooling system.
  - 4. Condenser Coils: In a compressor unit, the coil dissipates heat from the refrigerant, changing the refrigerant from vapor to liquid.
  - 5. Refrigerant: Absorbs heat by a change of state (evaporation) from liquid to a gas, and releases heat by a change of state (condenses) from gas back to a liquid.
  - 6. SEER (Seasonal Energy Efficiency Ratio): Measure of cooling efficiency for air conditioners and heat pumps. A ratio of total cooling in comparison to electrical energy input in watts per hour. Higher the seer, the more energy efficient the unit. Since 2006, the minimum SEER required by the Department of Energy is 13.00 and 15.00+ SEER is considered high efficiency.
  - 7. Split System: Combination of an outdoor unit (air conditioner or heat pump) with an indoor unit (furnace or air handler). Split systems must be matched for optimum efficiency.
- B. Reference Standards:
  - 1. American National Standards Institute / Air-Conditioning, Heating, and Refrigeration Institute:
    - a. ANSI/AHRI Standard 210/240-2017, 'Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment' (formerly ARI Standard 210/240).
  - 2. American National Standards Institute / American Society of Heating, Refrigerating and Air-Conditioning Engineers:
    - a. ANSI/ASHRAE 15-2016 and 34-2016, 'Safety Standard and Designation and Classification of Refrigerants'.

**1.3 SUBMITTALS**

- A. Informational Submittals:
  - 1. Tests and Evaluation Reports:
    - a. Manufacturer Reports: Equipment check-out sheets.
- B. Special Procedure Submittals:
  - 1. Installer must register with Manufacturer before submitting Manufacturer Warranty:

- a. Installer to contact Owner's Representative (FM Group or Project Manager) for following MANDATORY information to be given to Manufacturer before Manufacturer will issue Manufacturer's 'Special LDS Warranty' included with Closing Submittal:
  - 1) This must be given to Manufacturer:
    - a) Name of Owner (name of FM Group) \_\_\_\_\_
    - b) Mailing Address (FM office address) \_\_\_\_\_
    - c) Building Property ID (unique 7 digit identifier) \_\_\_\_\_
    - d) Project site address: \_\_\_\_\_
    - e) Model Number of each Unit \_\_\_\_\_
    - f) Serial Number of each Unit \_\_\_\_\_
    - g) Date of Installation / Startup \_\_\_\_\_
  2. Qualification Statements:
    - a. Technician certificate for use in HFC and HCFC refrigerants.
- C. Closeout Submittals:
  1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Manufacturer's 'Special LDS Warranty' including required Owner / Manufacturer mandatory information.
    - b. Record Documentation:
      - 1) Manufacturers Documentation:
        - a) Equipment checkout sheet: Complete and sign all items for each unit.

## 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  1. Each unit shall be UL / ULC or ETL labeled.
  2. Comply with ANSI/AHRI Standard 210/240.
  3. Refrigeration compressor, coils, and specialties shall be designed to operate with CFC-free refrigerants.
- B. Qualifications. Section 01 4301 applies, but is not limited to the following:
  1. Installer: Refrigerant piping shall be installed by refrigeration contractor licensed by State and by technicians certified in use of HFC and HCFC refrigerants.

## 1.5 WARRANTY

- A. Manufacturer's Warranty:
  1. Provide Manufacturer's Special LDS Warranty for the following:
    - a. Provide ten (10) year limited warranty on compressor and five (5) year limited warranty on parts from date of 'start-up'.
    - b. Record 'start-up' date on warranty certificate for each unit.

## PART 2 - PRODUCTS

### 2.1 ASSEMBLIES

- A. Manufacturers:
  1. Manufacturer Contact List:
    - a. Carrier Corporation:
      - 1) Carrier National: Bradley Brunner (270) 282-1241 [Bradley.M.Brunner@Carrier.utc.com](mailto:Bradley.M.Brunner@Carrier.utc.com).
      - 2) Carrier Utah: Bret Adams (Contractors Heating/Cooling Supply) (801) 224-1020 ext. 2527 [bret.adams@mc.supply](mailto:bret.adams@mc.supply).
    - b. Lennox Industries:
      - 1) For pricing and information call Lennox Mountain Commercial at (800) 972-3283.



- 2) Lennox National Contact: Jeff Barrett (801) 556-6114 [jeff.barrett@lennoxind.com](mailto:jeff.barrett@lennoxind.com).
- c. York (US Air Conditioning Distributors):
  - 1) Nick Filimoehala (801) 463-5323 [n.filimoehala@us-ac.com](mailto:n.filimoehala@us-ac.com).
- B. Performance:
  1. Capacities: SEER rating as defined by AHRI shall be 13.0 or greater.
- C. Manufactured Units:
  1. Compressor Units (5 Tons or Less):
    - a. General:
      - 1) Units shall be operable down to 0 deg F (minus 18 deg C) outdoor temperature.
      - 2) Use R-410a refrigerant.
      - 3) Only one liquid line, one suction line, and one power connection shall be made to each compressor. Provide charging valves.
    - b. Condenser Coils:
      - 1) Aluminum plate fins mechanically bonded to seamless copper tubes or 'Spine Fin' trade mark system which has aluminum fins epoxy bonded to aluminum tubes or micro-channel.
      - 2) Provide stamped louver coil guard for unit.
    - c. Fans:
      - 1) Direct driven propeller type.
      - 2) Fan motor shall be single or two speed, thermostatically controlled, permanently lubricated, and designed with permanent protection.
      - 3) Motors shall be resiliently mounted.
      - 4) Each fan shall have a safety guard.
    - d. Compressor:
      - 1) Each condenser unit shall have only one compressor.
      - 2) Design with following features:
        - a) Externally mounted brass service valves with charging connections.
        - b) Crankcase heater.
        - c) Resilient rubber mounts.
        - d) Compressor motor-overload protection.
        - e) Single speed.
    - e. Controls:
      - 1) Factory wired and located in separate enclosure.
      - 2) Following three paragraphs may not be factory installed and will therefore have to be field installed.
      - 3) Safety devices:
        - a) High and low pressure cutout.
        - b) Condenser fan motor-overload devices.
      - 4) Anti-cycle timers to prevent units from starting up again for five minutes after any power interruption.
      - 5) Head pressure type low ambient kit.
    - f. Casing:
      - 1) Fully weatherproof for outdoor installation. Finish shall be weather resistant.
    - g. Openings shall be provided for power and refrigerant connections.
    - h. Panels shall be removable for servicing.
    - i. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) North Region:
        - a) Carrier: 24ABB3.
        - b) Lennox: 13ACXN.
        - c) York: YCD.

## 2.2 ACCESSORIES

- A. Vibration Isolators:
  1. 4 inches (100 mm) square by 3/4 inch (19 mm) thick minimum neoprene type vibration isolation pads anchored solidly to concrete slab.

**PART 3 - EXECUTION****3.1 INSTALLATION**

## A. General:

1. Set compressor units level on concrete slab on vibration isolation pads located at each corner of unit. This does not apply to compressor units that have composite non-metal bottom.
2. Do not use capillary tube and piston type refrigerant metering devices.

**3.2 FIELD QUALITY CONTROL**

## A. Manufacturer Services:

1. Compressor units shall be started up, checked out, and adjusted by compressor unit Installer.
2. Use equipment checkout sheet provided by Manufacturer:
  - a. Complete and sign all items on sheet.

**END OF SECTION**

## **DIVISION 26: ELECTRICAL**

### **26 0500 COMMON WORK RESULTS FOR ELECTRICAL**

- 26 0501 COMMON ELECTRICAL REQUIREMENTS
- 26 0519 LINE-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
- 26 0523 CONTROL-VOLTAGE ELECTRICAL CABLES
- 26 0526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
- 26 0533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS SCHEDULE
- 26 0613 ELECTRICAL EQUIPMENT MOUNTING HEIGHT SCHEDULE

### **26 2000 LOW-VOLTAGE ELECTRICAL TRANSMISSION**

- 26 2726 WIRING DEVICES
- 26 2816 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

### **26 5000 LIGHTING**

- 26 5100 INTERIOR LIGHTING
- 26 5200 EMERGENCY LIGHTING

END OF TABLE OF CONTENTS

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**SECTION 26 0501****COMMON ELECTRICAL REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. General electrical system requirements and procedures.
  - 2. Perform excavating and backfilling work required by work of this Division as described in Contract Documents.
  - 3. Make electrical connections to equipment provided under other Sections.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. National Fire Protection Association / American National Standards Institute:
    - a. NFPA 70, National Electric Code (NEC).
  - 2. National Electrical Manufacturing Association Standards (NEMA):
    - a. NEMA 250, 'Enclosure for Electrical Equipment (1000 Volts Maximum)'.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate with Owner for equipment and materials to be removed by Owner.
  - 2. Coordinate with Mechanical Drawings for schematic wiring diagrams under Division 26 installation requirements.

**1.4 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data:
    - a. Provide following information for each item of equipment:
      - 1) Catalog Sheets.
      - 2) Assembly details or dimension drawings.
      - 3) Installation instructions.
      - 4) Manufacturer's name and catalog number.
      - 5) Name of local supplier.
    - b. Furnish such information for following equipment:
      - 1) Section 26 2816: Enclosed switches and circuit breakers.
      - 2) Motor starters
    - c. Do not purchase equipment before approval of product data.
  - 2. Shop Drawings:
    - a. Indicate precise equipment to be used, including all options specified. Indicate wording and format of nameplates where applicable. Submit in three-ring binder with hard cover.
- B. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. Report of site tests, before Substantial Completion.
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

- a. Operations and Maintenance Data:
  - 1) Provide operating and maintenance instructions for each item of equipment submitted under Product Data.
- b. Record Documentation:
  - 1) Manufacturers documentation:
    - a) Manufacturer's literature.
    - b) Include copy of approved shop drawings.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  1. NEC and local ordinances and regulations shall govern unless more stringent requirements are specified.
  2. Material and equipment provided shall meet standards of NEMA or UL and bear their label wherever standards have been established and label service is available.
- B. Qualifications: Requirements of Section 01 4301 applies, but not limited to following:
  1. Electrical Subcontractor:
    - a. Company specializing in performing work of this section.
      - 1) Minimum five (5) years experience in electrical installations.
      - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
    - b. Upon request, submit documentation.
  2. Installer:
    - a. Licensed for area of Project.
    - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
    - c. Upon request, submit documentation.

## 1.6 TEMPORARY POWER:

- A. Provide temporary power, including and wiring for lighting and power outlets so that scheduled use of the building is not interrupted. Verify requirements with General Conditions. Comply with NEC for temporary power requirements.

## PART 2 - PRODUCTS

### 2.1 SYSTEMS

- A. Performance:
  1. Design Criteria:
    - a. Materials and equipment provided under following Sections shall be by same Manufacturer:
      - 1) Section 26 2816: Enclosed Switches And Circuit Breakers.
      - 2) Motor starters

## PART 3 - EXECUTION

### 3.1 INSTALLERS

- A. Acceptable Installers:
  1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

### 3.2 EXAMINATION

- A. Verification Of Conditions:
  - 1. Confirm dimensions, ratings, and specifications of equipment to be installed and coordinate these with site dimensions and with other Sections.
- B. Evaluation And Assessment:
  - 1. All relocations, reconnections, and removals are not necessarily indicated on Drawings. Include such work without additional cost to Owner.

### 3.3 PREPARATION

- A. Disconnect equipment that is to be removed or relocated. Carefully remove, disassemble, or dismantle as required, and store in approved location on site, existing items to be reused in completed work.
- B. Where affected by demolition or new construction, relocate, extend, or repair raceways, conductors, outlets, and apparatus to allow continued use of electrical system. Use methods and materials as specified for new construction.
- C. Perform drilling, cutting, block-offs, and demolition work required for removal of necessary portions of electrical system. Do not cut joists, beams, girders, trusses, or columns without prior written permission from Architect. Locating hidden items such as conduit, rebar etc. in concrete, walls and ceilings shall be done by non-destructive methods such as X-ray before any work begins.
- D. Remove concealed wiring and conduit abandoned due to demolition or new construction. Remove circuits, conduits, and conductors that are not to be re-used back to next active fixture, device, or junction box.
- E. Patch, repair, and finish surfaces affected by electrical demolition work, unless work is specifically specified to be performed under other Sections of the specifications.

### 3.4 INSTALLATION

- A. General:
  - 1. Locations of electrical equipment shown on Drawings are approximate only. Field verify actual locations for proper installation.
  - 2. Coordinate electrical equipment locations and conduit runs with those providing equipment to be served before installation or rough in.
    - a. Notify Architect of conflicts before beginning work.
    - b. Coordinate locations of power and lighting outlets in mechanical rooms and other areas with mechanical equipment, piping, ductwork, cabinets, etc, so they will be readily accessible and functional.
  - 3. Work related to other trades which is required under this Division, such as cutting and patching, trenching, and backfilling, shall be performed according to standards specified in applicable Sections.

### 3.5 FIELD QUALITY CONTROL

- A. Field Tests:
  - 1. Test systems and demonstrate equipment as working and operating properly. Notify Architect before test. Rectify defects at no additional cost to Owner.
  - 2. Measure current for each phase of each motor under actual final load operation, i.e. after air balance is completed for fan units, etc. Record this information along with full-load nameplate current rating and size of thermal overload unit installed for each motor.

**3.6 CLEANING**

- A. Remove obsolete raceways, conductors, apparatus, and lighting fixtures promptly from site and dispose of legally.

**3.7 CLOSEOUT ACTIVITIES**

- A. Training:
  - 1. Provide competent instructor for three days to train Owner's maintenance personnel in operation and maintenance of electrical equipment and systems. Factory representatives shall assist this instruction as necessary. Schedule instruction period at time of final inspection.

**END OF SECTION**



**SECTION 26 0519****LINE-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Quality of conductors used on Project except as excluded below.
- B. Related Requirements:
  - 1. Section 23 0933: 'Electric and Electronic Control System for HVAC' for conductors and cables for temperature control system.
  - 2. Section 26 0501: 'Common Electrical Requirements'.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Line Voltage: Over 70 Volts.
- B. Reference Standards:
  - 1. National Fire Protection Association:
    - a. NFPA (Fire) 70, 'National Electric Code (NEC)' (2014 Edition or most recent edition adopted by AHJ including all applicable amendments and supplements).

**PART 2 - PRODUCTS****2.1 SYSTEMS**

- A. Line Voltage Conductors:
  - 1. Copper with AWG sizes as shown:
    - a. Minimum size shall be No. 12 except where specified otherwise.
    - b. Conductor size No. 8 and larger shall be stranded.
  - 2. Insulation:
    - a. Standard Conductor Size No. 10 And Smaller: 600V type THWN or XHHW (75 deg C).
    - b. Standard Conductor Size No. 8 And Larger: 600V Type THW, THWN, or XHHW (75 deg C).
    - c. Higher temperature insulation as required by NEC or local codes.
  - 3. Colors:
    - a. 208Y / 120 V System:
      - 1) Black: Phase A.
      - 2) Red: Phase B.
      - 3) Blue: Phase C.
      - 4) Green: Ground.
      - 5) White: Neutral.
    - b. 480Y / 277 Volt System:
      - 1) Brown: Phase A.
      - 2) Orange: Phase B.
      - 3) Yellow: Phase C.
      - 4) Gray: Neutral.
      - 5) Green: Ground.

- c. Conductors size No. 10 and smaller shall be colored full length. Tagging or other methods for coding of conductors size No. 10 and smaller not allowed.
  - d. For feeder conductors larger than No. 10 at pull boxes, gutters, and panels, use painted or taped band or color tag color-coded as specified above.
- B. Line Voltage Cables:
1. Metal Clad Cable (MC) may be used as restricted below:
    - a. Copper conductors.
    - b. Sizes #12 through #8.
    - c. Use only in indoor dry locations where:
      - 1) Not subject to damage.
      - 2) Not in contact with earth.
      - 3) Not in concrete.
      - 4) Not exposed.
- C. Standard Connectors:
1. Conductors No. 8 And Smaller: Steel spring wire connectors.
  2. Conductors Larger Than No. 8: Pressure type terminal lugs.
  3. Connections Outside Building: Watertight steel spring wire connections with waterproof, non-hardening sealant.
- D. Terminal blocks for tapping conductors:
1. Terminals shall be suitable for use with 75 deg C copper conductors.
  2. Acceptable Products:
    - a. 16323 by Cooper Bussmann, Ellisville, MO [www.bussmann.com](http://www.bussmann.com)
    - b. LBA363106 by Square D Co, Palatine, IL [www.us.squared.com](http://www.us.squared.com).
    - c. Equal as approved by Architect before bidding. See Section 01 6200.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General:
1. Conductors and cables shall be continuous from outlet to outlet.
  2. Do not use direct burial cable.
- B. Line Voltage Conductors:
1. Install conductors in raceway where indicated on Drawings. Run conductors of different voltage systems in separate conduits.
  2. Route circuits at own discretion, however, circuiting shall be as shown in Panel Schedules. Group circuit homeruns to panels as shown on Drawings.
  3. Neutrals:
    - a. On three-phase, 4-wire systems, do not use common neutral for more than three circuits.
    - b. On single-phase, 3-wire systems, do not use common neutral for more than two circuits.
    - c. Run separate neutrals for each circuit where specifically noted on Drawings.
    - d. Where common neutral is run for two or three home run circuits, connect phase conductors to breakers in panel which are attached to separate phase legs:
      - 1) Provide breaker tie so that all circuits that share common neutral are simultaneously disconnected.
      - 2) Neutral conductors shall be of same size as phase conductors unless specifically noted otherwise.
  4. Pulling Conductors:
    - a. Do not pull conductors into conduit until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
    - b. Do not use heavy mechanical means for pulling conductors.
    - c. Use only listed wire pulling lubricants.

- C. Line Voltage Cables:
1. Route circuits at own discretion, however, circuiting and numbering shall be as shown in Panel Schedules.
  2. Support cables using approved staples, cable ties, straps, hangers, or similar fittings, spaced as required.
  3. Where installing in framing, do not bore holes in joists or beams outside center 1/3 of member depth or within 24 inches (600 mm) of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width. Holes shall be one inch diameter maximum.
  4. Conceal cables within ceilings and walls of finished areas. Cables may be exposed in unfinished areas but not run on floors of mechanical equipment spaces or in such a way that they obstruct access to, operation of, or servicing of equipment.
  5. Install exposed cables parallel to or at right angles to building structure lines.
  6. Keep cables 6 inches (150 mm) minimum from hot water pipes.
  7. Do not support cables from mechanical ducts or duct supports without Architect's written approval.
  8. Prohibited procedures:
    - a. Boring holes for installation of cables in vertical truss members.
    - b. Notching of structural members for installation of cables.

**END OF SECTION**

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**SECTION 26 0523****CONTROL-VOLTAGE ELECTRICAL CABLES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install control-voltage electrical cables as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 23 0933: Cables for Temperature Control System.
  - 2. Section 26 0501: Common Electrical Requirements.

**1.2 REFERENCES**

- A. Definitions:
  - 1. Control Voltage: 70 Volts and under.

**PART 2 - PRODUCTS****2.1 SYSTEM**

- A. Manufacturers:
  - 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.
    - a. Alpha Wire Co, Elizabeth, NJ [www.alphawire.com](http://www.alphawire.com).
    - b. Belden Wire & Cable Co, Richmond, IN [www.belden.com](http://www.belden.com).
    - c. Liberty Wire & Cable, Colorado Springs, CO [www.libertycable.com](http://www.libertycable.com).
    - d. West Penn Wire Corp, Washington, PA [www.westpenn-cdt.com](http://www.westpenn-cdt.com).

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. General:
  - 1. Cables shall be continuous and without splices from source to outlet.
  - 2. Install cables in raceway. Run cables of different systems in separate conduits.
  - 3. Pulling cables into conduit:
    - a. Do not pull cables until raceway system is complete and cabinets and outlet boxes are free of foreign matter and moisture.
    - b. Do not use heavy mechanical means for pulling cables.
    - c. Use only listed wire pulling lubricants.
  - 4. Prohibited procedures:
    - a. Boring holes for installation of cables in vertical truss members.
    - b. Notching of structural members for installation of cables.

**END OF SECTION**

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**SECTION 26 0526****GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install grounding for electrical installation as described in Contract Documents except as excluded below.
- B. Related Requirements:
  - 1. Section 26 0501: Common Electrical Requirements.

**1.2 QUALITY ASSURANCE**

- A. Regulatory Agency Sustainability Approvals: Requirements of Section 27 1501 applies, but is not limited to following:
  - 1. Cable assemblies shall be UL / CE Listed and CSA Certified. Cables shall be a distinctive green or green/yellow in color, and all jackets shall be UL, VW-1 flame rated.
  - 2. Grounding shall conform to all required Commercial Building Grounding and Bonding Requirements for Telecommunications, Electrical Codes, and Manufacturer's grounding requirements.

**PART 2 - PRODUCTS****2.1 SYSTEM**

- A. Manufacturers:
  - 1. Type One Acceptable Products:
    - a. 'Cadweld' by Erico International, Solon, OH [www.erico.com](http://www.erico.com).
    - b. 'ThermOweld' by Continental Industries, Tulsa, NE [www.conind.com](http://www.conind.com).
    - c. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Performance:
  - 1. Design Criteria:
    - a. Size materials as shown on Drawings and in accordance with applicable codes.
- C. Materials:
  - 1. Grounding And Bonding Jumper Conductors: Bare copper with green insulation.
  - 2. Make grounding conductor connections to ground rods and water pipes using approved bolted clamps listed for such use.
  - 3. Service Grounding Connections and Cable Splices: Make by exothermic process.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Interface with Other Work: Coordinate with Section 03 3111 in installing grounding conductor and placing concrete. Do not allow placement of concrete before Architect's inspection of grounding conductor installation.
- B. Grounding conductors and bonding jumper conductors shall be continuous from terminal to terminal without splice. Provide grounding for following.
  - 1. Conduits and other conductor enclosures.
  - 2. Neutral or identified conductor of interior wiring system.
  - 3. Non-current-carrying metal parts of fixed equipment such as motors, starter and controller cabinets, instrument cases, and lighting fixtures.
- C. Pull grounding conductors in non-metallic raceways, in flexible steel conduit exceeding **72 inches** in length, and in flexible conduit connecting to mechanical equipment.
- D. Provide grounding bushings on all feeder conduit entrances into panelboards and equipment enclosures.
- E. Bond conduit grounding bushings to enclosures with minimum #10 AWG conductor.
- F. Connect equipment grounds to building system ground.
  - 1. Use same size equipment grounding conductors as Phased conductors up through #10 AWG.
  - 2. Use NEC Table 250.122 for others unless noted otherwise in Drawings.
- G. Run separate insulated grounding cable from each equipment cabinet to electrical panel. Do not use intermediate connections or splices. Affix directly to cabinet.
- H. On motors, connect ground conductors to conduit with approved grounding bushing and to metal frame with bolted solderless lug.
- I. Ground cabinet of transformers to conduit and ground wires, if installed. Bond transformer secondary neutral conductor to cabinet.

### **3.2 FIELD QUALITY CONTROL**

- A. Field Inspections:
  - 1. Notify Architect for inspection two days minimum before placing concrete over grounding conductor.

**END OF SECTION**



**SECTION 26 0533****RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Quality of material and installation procedures for raceway, boxes, and fittings used on Project but furnished under other Divisions.
  - 2. Furnish and install raceway, conduit, and boxes used on Project not specified to be installed under other Divisions.
  - 3. Furnish and install air-vapor barrier boxes as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 26 0501: General Electrical Requirements.

**PART 2 - PRODUCTS****2.1 SYSTEM**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Cooper B-Line, Highland, IL [www.b-line.com](http://www.b-line.com).
    - b. Hubbell Incorporated, Milford, CT [www.hubbell-wiring.com](http://www.hubbell-wiring.com) or Hubbell Canada Inc, Pickering, ON (905) 839-4332.
    - c. Square D, Palatine, IL [www.squared.com](http://www.squared.com).
    - d. Thomas & Betts, Memphis, TN [www.tnb.com](http://www.tnb.com) or Thomas & Betts Ltd, Iberville, PQ (450) 347-5318.
    - e. Walker Systems Inc, Williamstown, WV (800) 240-2601 or Walker Systems Inc / Wiremold Canada Inc, Fergus, ON (519) 843-4332.
    - f. Wiremold Co, West Hartford, CT [www.wiremold.com](http://www.wiremold.com).
- B. Performance:
  - 1. Design Criteria: All aspects of design of sound system have been included as requirements of Owner. Do not make changes to any aspects of installation, design, or equipment pertaining to sound system without Owner's approval through Architect and Sound Consultant.
- C. Materials:
  - 1. Raceway And Conduit:
    - a. Sizes:
      - 1) Minimum 3/4 inch (19 mm) above ground unless indicated otherwise.
      - 2) Minimum 1" underground or under slab unless indicated otherwise.
    - b. Types: Usage of each type is restricted as specified below by product.
      - 1) Galvanized rigid steel or galvanized intermediate metal conduit (IMC) is allowed for use in all areas. Where in contact with earth or concrete, wrap buried galvanized rigid steel and galvanized IMC conduit and fittings completely with vinyl tape.
      - 2) Galvanized Electrical Metallic Tubing (EMT)Conduit:
        - a) Allowed for use only in indoor dry locations where it is:
          - (1) Not subject to damage.
          - (2) Not in contact with earth.
          - (3) Not in concrete.

- b) For metal conduit systems, flexible steel conduit is required for final connections to indoor mechanical equipment.
    - 3) Schedule 40 Polyvinyl Chloride (PVC) Conduit:
      - a) Allowed for use only underground or below concrete with galvanized rigid steel or IMC elbows and risers. Minimum underground PVC conduit size shall be One inch.
    - 4) Listed, Liquid-Tight Flexible Metal Conduit:
      - a) Use in outdoor final connections to mechanical equipment, length not to exceed 36 inches (900 mm).
  - c. Prohibited Raceway Materials:
    - 1) Aluminum conduit.
    - 2) Armored cable type AC (BX) cable.
    - 3) MC (metal clad) cable (except for connections less than 4ft)
    - 4) Romex cable
2. Raceway And Conduit Fittings:
- a. Rigid Steel Conduit And IMC: Threaded and designed for conduit use.
  - b. EMT:
    - 1) Steel set screw housing type.
  - c. PVC Conduit:
    - 1) PVC type. Use PVC adapters at all boxes.
    - 2) PVC components, (conduit, fittings, cement) shall be from same Manufacturer.
  - d. Flexible Steel Conduit: Screw-in type.
  - e. Liquid-tight Flexible Metal Conduit: Sealite type.
  - f. Expansion fittings shall be equal to OZ Type AX sized to raceway and including bonding jumper.
  - g. Prohibited Fitting Materials:
    - 1) Crimp-on, tap-on, indenter type fittings.
    - 2) Cast set-screw fittings for EMT.
    - 3) Spray (aerosol) PVC cement.
3. Seal Devices: OZ Type WSK.
4. Outlet Boxes:
- a. Galvanized steel of proper size and shape are acceptable for all systems. Where metal boxes are used, provide following:
    - 1) Provide metal supports and other accessories for installation of each box.
    - 2) Equip ceiling and bracket fixture boxes with fixture studs where required.
    - 3) Equip outlets in plastered, paneled, and furred finishes with plaster rings and extensions to bring box flush with finish surface.
  - b. Non-metallic boxes may be used only for control voltage wiring systems.
  - c. HVAC Instrumentation And Control:
    - 1) Junction boxes in mechanical equipment areas shall be 4 inches (100 mm) square.
    - 2) Boxes for remote temperature sensor devices shall be recessed single device.
    - 3) Boxes for thermostats shall be 4 inches (100 mm) square with raised single device cover.
5. Air-Vapor Barrier Boxes:
- a. Pre-molded polyethylene box installed in all exterior framing walls (thermal envelope) around recessed outlet boxes.
  - b. Class Two Quality Standard:
    - 1) Approved Manufacturer. See Section 01 6200 for definitions of Classes.
      - a) Lessco Low Energy Systems Supply Company, Inc., Campbellsport, WI  
[www.lessco-airtight.com](http://www.lessco-airtight.com).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verification Of Conditions:
  - 1. Confirm dimensions, ratings, and specifications of materials to be installed and coordinate these with site dimensions and with other Sections.

### 3.2 INSTALLATION

- A. Interface With Other Work:
1. Coordinate with Divisions 22 and 23 for installation of raceway for control of plumbing and HVAC equipment.
  2. Before rough-in, verify locations of boxes with work of other trades to insure that they are properly located for purpose intended.
- B. Conduit And Raceway:
1. Conceal raceways within ceilings, walls, and floors, except at Contractor's option, conduit may be exposed on walls or ceilings of mechanical equipment areas and above acoustical panel suspension ceiling systems. Install exposed raceway runs parallel to or at right angles to building structure lines.
  2. Keep raceway runs 6 inches (150 mm) minimum from hot water pipes.
  3. Make no more than four quarter bends, 360 degrees total, in any conduit run between outlet and outlet, fitting and fitting, or outlet and fitting.
    - a. Make bends and offsets so conduit is not injured and internal diameter of conduit is not effectively reduced.
    - b. Radius of curve shall be at least minimum indicated by NEC.
  4. Cut conduit smooth and square with run and ream to remove rough edges. Cap raceway ends during construction. Clean or replace raceway in which water or foreign matter have accumulated.
  5. Installation in Concrete:
    - a. Install no conduit in concrete unless outside diameter is less than 1/3 of slab, wall, or beam thickness in which it is embedded.
    - b. Position conduits in center of concrete below reinforcing steel, and separated by minimum lateral spacing of three diameters.
    - c. Elbows embedded in concrete shall be rigid steel or IMC and stubouts from concrete slabs shall extend 3 inches (75 mm) minimum before making connection to EMT.
    - d. Separate conduits penetrating structural slabs in buildings by 2 inches (50 mm) minimum.
    - e. Install seal device where underground raceways penetrate concrete building wall.
  6. Installation In Framing:
    - a. Do not bore holes in joists or beams outside center 1/3 of member depth or within 24 inches (600 mm) of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width.
    - b. Holes shall be one inch (25 mm) diameter maximum.
  7. Underground Raceway And Conduit:
    - a. Bury underground raceway installed outside building 24 inches (600 mm) deep minimum.
    - b. Bury underground conduit in planting areas 18 inches (450 mm) deep minimum. It is permissible to install conduit directly below concrete sidewalks, however, conduit must be buried 18 inches (450 mm) deep at point of exit from planting areas.
  8. Conduit And Raceway Support:
    - a. Securely support raceway with approved straps, clamps, or hangers, spaced as required.
    - b. Do not support from mechanical ducts or duct supports without Architect's written approval. Securely mount raceway supports, boxes, and cabinets in an approved manner by:
      - 1) Expansion shields in concrete or solid masonry.
      - 2) Toggle bolts on hollow masonry units.
      - 3) Wood screws on wood.
      - 4) Metal screws on metal.
  9. Prohibited Procedures:
    - a. Use of wooden plugs inserted in concrete or masonry units for mounting raceway, supports, boxes, cabinets, or other equipment.
    - b. Installation of raceway that has been crushed or deformed.
    - c. Use of torches for bending PVC.
    - d. Spray applied PVC cement.
    - e. Boring holes in truss members.
    - f. Notching of structural members.
    - g. Supporting raceway from ceiling system support wires.
    - h. Nail drive straps or tie wire for supporting raceway.

- C. Boxes:
1. Boxes shall be accessible and installed with approved cover.
  2. Do not locate device boxes that are on opposite sides of framed walls in the same stud space. In other wall construction, do not install boxes back to back.
  3. Locate boxes so pipes, ducts, or other items do not obstruct outlets.
  4. Install outlets flush with finished surface and level and plumb.
  5. Support switch boxes larger than two-gang with side brackets and steel bar hangers in framed walls.
  6. At time of substantial completion, install blank plates on uncovered outlet boxes that are for future use.
  7. Install air-vapor barrier boxes.
    - a. Follow Manufacturer's installation instructions.

**END OF SECTION**

**SECTION 26 0613**

**ELECTRICAL EQUIPMENT MOUNTING HEIGHT SCHEDULE**

**PART 1 - GENERAL: Not Used**

**PART 2 - PRODUCTS: Not Used**

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. Unless otherwise indicated, mount center of outlets or boxes at following heights above finish floor. Refer special conditions to Architect before rough-in and locate outlet under his direction.

B. Mounting Heights:

1. HVAC:

- a. Temperature Control Junction Boxes: As indicated on Drawings.
- b. Thermostats not mounted in occupied space: As indicated on Drawings.
- c. Remote Temperature Sensors and thermostats mounted in occupied space:
  - 1) Wall-Mounted 50 inches (1 270 mm) to top.
- d. Indoor Motor Disconnects: 60 inches (1 525 mm).
- e. Outdoor Motor Disconnects: As indicated on Drawings.
- f. Motor Controls: 60 inches (1 525 mm).

2. Plumbing:

- a. Electric Water Cooler Outlets: Mount so outlet and cord are hidden by water cooler and outlet is accessible for resetting for GFCI trip.

3. Electrical:

- a. Distribution Panels: 72 inches (1 830 mm) to top.
- b. Receptacles: 18 inches (450 mm).
- c. Wall Switches: 42 inches (1 065 mm).

**END OF SECTION**

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**SECTION 26 2726****WIRING DEVICES****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install wiring devices complete with plates as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.

**PART 2 - PRODUCTS****2.1 COMPONENTS**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Cooper Wiring Devices, Peachtree City, GA [www.cooperwiringdevices.com](http://www.cooperwiringdevices.com).
    - b. General Electric Industrial Systems, Charlotte, NC [www.geindustrial.com](http://www.geindustrial.com).
    - c. Hubbell Building Automation, Austin, TX [www.hubbell-automation.com](http://www.hubbell-automation.com).
    - d. Hubbell Inc, Milford, CT [www.hubbell-wiring.com](http://www.hubbell-wiring.com) or Hubbell Canada Inc, Pickering, ON (800) 263-4622 or (905) 839-4332.
    - e. Hunt Control Systems Inc, Fort Collins, CO [www.huntdimming.com](http://www.huntdimming.com).
    - f. Intermatic Inc, Spring Grove, IL [www.intermatic.com](http://www.intermatic.com).
    - g. IR-TEC America, Inc., Brea, CA [www.irtec.com/en-ira/](http://www.irtec.com/en-ira/).
    - h. Leviton Manufacturing Co, Little Neck, NY [www.leviton.com](http://www.leviton.com) or Leviton Manufacturing of Canada Ltd, Pointe-Claire, QB (800) 461-2002 or (514) 954-1840.
    - i. Legrand, West Hartford, CT [www.legrand.us.com](http://www.legrand.us.com) or Vaughan, ON [www.legrand.ca.com](http://www.legrand.ca.com).
    - j. Lutron Electronics Co Inc, Coopersburg, PA [www.lutron.com](http://www.lutron.com).
    - k. Ortronics, New London, CT [www.ortronics.com](http://www.ortronics.com).
    - l. Paragon Electric Co Inc, Carol Stream, IL [www.icca.invensys.com/paragon](http://www.icca.invensys.com/paragon) or Paragon Electric, Mississauga, ON (800) 951-5526 or (905) 890-5956.
    - m. Pass & Seymour, Syracuse, NY [www.passandseymour.com](http://www.passandseymour.com) or Pass & Seymour Canada Inc, Concord, ON (905) 738-9195.
    - n. Philips Lighting Co, Somerset, NJ [www.lighting.philips.com/nam](http://www.lighting.philips.com/nam) or Philips Lighting Canada, Scarborough, ON (416) 292-3000.
    - o. Red Dot div of Thomas & Betts, Memphis, TN [www.tnbcom](http://www.tnbcom).
    - p. Schneider Electric North America, Palatine, IL [www.schneider-electric.com](http://www.schneider-electric.com) (847) 397-2600.
    - q. Sensorswitch, Wallingford, CT [www.sensorswitch.com](http://www.sensorswitch.com).
    - r. Siemon Company, Watertown, CT [www.siemon.com](http://www.siemon.com).
    - s. Square D Co, Palatine, IL [www.squared.com](http://www.squared.com).
    - t. Suttle, Hector, MN [www.suttleonline.com](http://www.suttleonline.com).
    - u. Tork Inc, Mount Vernon, NY [www.tork.com](http://www.tork.com).
    - v. Watt Stopper Inc, Santa Clara, CA [www.wattstopper.com](http://www.wattstopper.com).
  - 2. Product Options:
    - a. Faces shall be nylon where available.
    - b. Devices of single type shall be from same Manufacturer.
    - c. Devices are listed as white. Use white devices on light colored walls, brown on dark colored walls, and black on black walls.
- B. Switches:

1. Standard Style:
  - a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) 20 AMP, single pole:
      - a) Cooper: 2221V.
      - b) Hubbell: HBL1221-I.
      - c) Pass & Seymour: 20AC1-I.
      - d) Leviton: 1221-2I.
    - 2) Two Pole:
      - a) Cooper: 2222V.
      - b) Hubbell: HBL1222-I.
      - c) Pass & Seymour: 20AC2-I.
      - d) Leviton: 1222-2I.
    - 3) Three Way:
      - a) Cooper: 2223V.
      - b) Hubbell: HBL1223-I.
      - c) Pass & Seymour: 20AC3-I.
      - d) Leviton: 1223-2I.
    - 4) Four Way:
      - a) Cooper: 2224V.
      - b) Hubbell: HBL1224-I.
      - c) Pass & Seymour: 20AC4-I.
      - d) Leviton: 1224-2I.
    - 5) Pilot Switch:
      - a) Hubbell: HBL1221-PL.
      - b) Pass & Seymour: 20AC1-RPL.
      - c) Leviton: 1221-PLR.
    - 6) Lighted Toggle Switch:
      - a) Single Pole:
        - (1) Cooper: 2221-LTV.
        - (2) Hubbell: HBL1221-IL.
        - (3) Pass & Seymour: 20AC1-ISL.
        - (4) Leviton: 1221-LHI.
      - b) Three Way:
        - (1) Cooper: 2223-LTV.
        - (2) Hubbell: HBL1223-IL.
        - (3) Pass & Seymour: 20AC3-ISL.
        - (4) Leviton: 1223-7LC.
  - b. Custodian Room:
    - 1) 24-hour, in-wall, multiple automatic ON-OFF settings.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Intermatic: E1020.
      - b) Tork: 701A.
2. Digital Time/Timer Switch:
  - a. As shown in small Storage, Mechanical and Electrical Rooms.
  - b. Automatic countdown type:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Leviton: LTT60-1L.
      - b) Hubbell: TD200.
      - c) Pass & Seymour: RT1W.
      - d) Tork: SSA100.
      - e) Watt Stopper: TS-400-W.
3. Momentary Switches:
  - a. 15 AMP, specification grade.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Cooper: 1895W.
    - 2) Hubbell: HBL1556W.
    - 3) Legrand: 1250W.

C. Receptacles:

1. Standard Style:



- a. 15 AMP, specification grade, back and side wired, self grounding, tamper resistant.
  - b. Verified by UL to meet Fed Spec WC-596F.
  - c. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Cooper: TR5262.
    - 2) Hubbell: BR20.
    - 3) Leviton: TBR20.
    - 4) Pass & Seymour: TR20.
2. Ground Fault Circuit Interrupter (GFCI):
    - a. 15 AMP, specification grade.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) Cooper: GF15W.
      - 2) Hubbell: GF5252WA.
      - 3) Leviton: 8599-W.
      - 4) Pass & Seymour: 1594-W.
- D. Plates:
1. Standard Cover Plates:
    - a. Office / Occupied Areas:
      - 1) Nylon or high impact resistant thermoplastic.
      - 2) Color shall match wiring device.
    - b. All Other: Steel.
    - c. Ganged switches shall have gang plates.
    - d. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:
      - 1) Cooper.
      - 2) Hubbell.
      - 3) Leviton.
      - 4) Pass & Seymour.
  2. Weatherproof In-Use Receptacle Covers:
    - a. NEMA 3R rated.
    - b. Cast aluminum.
    - c. Compatible with GFCI receptacles.
    - d. Complete with weather resistant gaskets and stainless steel screws.
    - e. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) Hubbell: WP26MH, horizontal; WP26M, vertical.
      - 2) Intermatic: WP1010HMC, horizontal; WP1010MC, vertical.
      - 3) Red Dot: CKMG, horizontal; CKMGV, vertical.
- E. Occupancy Sensors:
1. Ceiling, ultrasonic type.
    - a. Complete with sensor and combined relay / control transformer.
    - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - 1) Cooper Controls:
        - a) Sensor: OAC-U-0501-R.
        - b) Relay / Transformer: SP20-MV.
      - 2) IR-TEC America:
        - a) Sensor: OS-361DT.
        - b) Relay / Transformer: PPU-300.
      - 3) Leviton:
        - a) Sensor: OSC05-RUW.
        - b) Relay / Transformer: OPP20-D2.
      - 4) Sensorswitch:
        - a) Sensor: CMPDT9.
        - b) Relay / Transformer: MP-20-SP0DM.
      - 5) Watt Stopper:
        - a) Sensor: W-500A.
        - b) Relay / Transformer: BZ-150.
    - c. Provide manual ON and OFF momentary override switches. Refer to Contract Drawings for number of switches.
  2. Ceiling, dual technology type.
    - a. Complete with sensor and relay / transformer.

- b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - 1) Cooper Controls:
    - a) Sensor: OAC-DT-0501-R.
    - b) Relay / Transformer: SP20-MV.
  - 2) IR-TEC America:
    - a) Sensor: OS-361DT.
    - b) Relay / Transformer: PPU-300.
  - 3) Leviton:
    - a) Sensor: OSC05-RMW.
    - b) Relay / Transformer: OPP20-D2.
  - 4) Sensorswitch:
    - a) Sensor: CMPDT9.
    - b) Relay / Transformer: MP-20-SP0DM.
  - 5) Watt Stopper:
    - a) Sensor: DT-305.
    - b) Relay / Transformer: BZ-150.
- c. Provide manual ON and OFF momentary override switches. Refer to Contract Drawings for number of switches.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install devices flush with walls, straight, and solid to box.

**END OF SECTION**

**SECTION 26 2816****ENCLOSED SWITCHES AND CIRCUIT BREAKERS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install disconnects as described in Contract Documents, except those provided integral with equipment.
- B. Related Requirements:
  - 1. Section 26 0501: Common Electrical Requirements.

**PART 2 - PRODUCTS****2.1 ASSEMBLIES**

- A. Manufacturers:
  - 1. Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories.
    - a. Disconnects: Same as Manufacturer of Project's main panelboard.
    - b. Fuses.
      - 1) Cooper Bussmann, Ellisville, IL [www.cooperbussmann.com](http://www.cooperbussmann.com).
      - 2) Edison Fuse, Ellisville, IL (314) 391-3443.
      - 3) Ferraz Shawmut, Newburyport, MA [www.ferrazshawmut.com](http://www.ferrazshawmut.com).
      - 4) Littelfuse Inc, Des Plaines, IL [www.littelfuse.com](http://www.littelfuse.com).
- B. Disconnects:
  - 1. Heavy-duty quick-make, quick-break type, non-fused unless indicated otherwise.
  - 2. Provide interlock to prevent opening of door when switch is in ON position.
  - 3. Provide means to lock switch in OFF position with padlock.
  - 4. Disconnects for motor circuits shall be horsepower rated.
  - 5. Disconnects For Furnace Units And Unit Heaters: Provide manual starter with thermal overload relay. Provide overload relay to match motor full load amps.
  - 6. Enclosures:
    - a. Interior: NEMA / CEMA Type 1.
    - b. Exterior: NEMA / CEMA Type 3R.
  - 7. Fuses:
    - a. Fuse fused disconnects with dual-element time delay fuses and equip with rejection type fuse holders.
    - b. Fuses on Project shall be from single manufacturer.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Label disconnects to indicate equipment served, such as Condensing Unit CU-1. Labeling shall include panel and circuit number used to feed power to motors or device. Use **1/16 inch (1.6 mm)** thick laminated plastic composition material with contrasting color core. Engraved letters shall be **1/4 inch (6 mm)** high. Attach labels with screws.

**END OF SECTION**

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**SECTION 26 5100****INTERIOR LIGHTING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install lighting system as described in Contract Documents, complete with lamps.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.
  - 2. Section 26 5121: 'Interior Lighting: LED Dimming Drivers'.
  - 3. Section 09 5116: 'Acoustical Tile Ceilings'.

**1.2 REFERENCES**

- A. Reference Standards:
  - 1. American National Standards Institute (ANSI):
    - a. ANSI C78.377-2017, 'American National Standard for Electric Lamps: Specification for the Chromaticity of Solid State Lighting Products'.
  - 2. Federal Communications Commission (FCC):
    - a. Code of Federal Regulations (CFR):
      - 1) FCC 47 CFR Part 18, 'Industrial, Scientific, and Medical Equipment'.
  - 3. Institute of Electrical and Electronics Engineers (IEEE):
    - a. IEEE C62.41.1-2002, 'Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits'.

**PART 2 - PRODUCTS****2.1 ASSEMBLIES**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Advance Transformer Co, Rosemont, IL [www.advancetransformer.com](http://www.advancetransformer.com).
    - b. Cooper Wiring Devices by Eaton, Peachtree City, GA [www.cooperindustries.com](http://www.cooperindustries.com).
    - c. General Electric Lighting, Hendersonville, NC or General Electric Lighting Canada Inc, Mississauga, ON [www.gelighting.com/na](http://www.gelighting.com/na).
    - d. Howard Lighting Products, Laurel, MS [www.howard-ind.com](http://www.howard-ind.com).
    - e. Novitas Inc, Peachtree City, GA [www.novitas.com](http://www.novitas.com).
    - f. Osram Sylvania, Danvers, MA [www.sylvania.com](http://www.sylvania.com) or Osram Sylvania Ltd, Mississauga, ON (905) 673-6171.
    - g. Philips Lighting Co, Somerset, NJ [www.lighting.philips.com/nam](http://www.lighting.philips.com/nam) or Philips Lighting Canada, Scarborough, ON (416) 292-3000.
    - h. Universal Lighting Technologies, Nashville, TN [www.universalballast.com](http://www.universalballast.com).
    - i. Venture Lighting International, Solon, OH [www.venturelighting.com](http://www.venturelighting.com).
    - j. Watt Stopper Inc, Santa Clara, CA [www.wattstopper.com](http://www.wattstopper.com).
    - k. Westinghouse Lighting Corp, Philadelphia, PA [www.westinghouselightbulbs.com](http://www.westinghouselightbulbs.com).
  - 2. Product Options: When several lighting fixtures are specified by name for one use on Drawings, select any one of those specified. Do not mix fixtures from different manufacturers specified for one use.

**B. Materials****1. Lighting Fixtures:****a. Type One Acceptable Products:**

- 1) See Fixture Schedule on Drawings for acceptable manufacturers and models.
- 2) Equals as approved by Architect before bidding. See Section 01 6200.

**b. See 'Light Fixture Schedule' provided by Owner's Representative.**

- 1) Correlated Color Temperature: 3500k.

**c. Other Lamps:**

- 1) Category Four Approved Manufacturers. See Section 01 6200 for definitions of Categories:

- a) General Electric.
- b) North American Philips.
- c) Osram / Sylvania.
- d) Westinghouse.

**d. LED Lamps and Fixtures:**

- 1) Replacement Lamps shall have minimum efficiency of 70 lm / W per LM 79.
- 2) Integral LED Lamps shall have minimum efficiency of 90 lm / W per LM 79.
- 3) Provide minimum rated life of 50,000 per LM 80 and LM 70 standards.
- 4) Color Temperature: 3500k.
- 5) Provide full spectrum color index of 80.

**C. Factory Assembly:**

1. Fixtures shall be fully assembled complete with necessary wiring, sockets, lamps, reflectors, ballasts, auxiliaries, plaster frames, recessing boxes, hangers, supports, lenses, diffusers, and other accessories essential for complete working installation.

**PART 3 - EXECUTION****3.1 INSTALLATION****A. Interface With Other Work:**

1. Coordinate with Sections under 09 5000 heading to obtain symmetrical arrangement of fixtures in acoustic tile ceiling as shown on Reflected Ceiling Plan in Contract.
2. In mechanical equipment rooms, coordinate locations of light fixtures with equipment locations to provide proper room illumination without obstruction. Suspend fixtures that must be mounted below pipes, ducts, etc, with chains or other Architect approved method.

- B. Securely mount fixtures. Support fixtures weighing **50 lbs (23 kg)** or more from building framing or structural members.

**3.2 ADJUSTMENT**

- A. Repair scratches or nicks on exposed surfaces of fixtures to match original undamaged conditions.

**END OF SECTION**

**SECTION 26 5200****EMERGENCY LIGHTING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install emergency battery units as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 26 0501: 'Common Electrical Requirements'.

**PART 2 - PRODUCTS****2.1 SYSTEMS**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Beghelli, Miramar, FL [www.beghelliusa.com](http://www.beghelliusa.com).
    - b. Bodine Emergency Lighting, Collierville, TN [www.bodine.com](http://www.bodine.com)
    - c. Dual-Lite, Cheshire, CT [www.dual-lite.com](http://www.dual-lite.com).
    - d. Iota Engineering Co, Tucson, AZ [www.iotaengineering.com](http://www.iotaengineering.com)
    - e. Lightolier, Fall River, MA [www.lightolier.com](http://www.lightolier.com).
    - f. Lithonia Lighting, Conyers, GA [www.lithonia.com](http://www.lithonia.com).
    - g. McPhilben / Day-Brite Lighting, Tupelo, MS [www.mcphilben.com](http://www.mcphilben.com).
    - h. Sure-Lites / Cooper Lighting, Elk Grove, IL [www.cooperlighting.com](http://www.cooperlighting.com).
- B. Materials:
  - 1. LED Battery Packs:
    - a. Design Criteria:
      - 1) Batteries shall be long life nickel cadmium type.
      - 2) Complete with charging indicator light and test switch.
      - 3) Components shall be fully concealed and easily accessible for maintenance or replacement.
      - 4) Factory installed in lighting fixture, or field installed to same standards.
    - b. Linear LED Lighting Fixtures:
      - 1) Battery pack shall operate one (1) lamp at approximately 1400 lumens initially and 60 percent minimum of initial lumens after ninety (90) minutes.
      - 2) Charger shall be capable of full recharge in twenty four (24) hours.
    - c. Class Two Quality Products: See Section 01 4301 for Manufacturer Qualifications and Section 01 6200:
      - 1) Any Manufacturer that conforms to Contract Documents requirements.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Battery Packs:
  - 1. General:
    - a. Wire so unit can be tested with lights on.

- b. Wire so lamps in normal mode are switched off with other lighting in area. Connect unit to unswitched conductor of normal lighting circuit.
- 2. Linear LED Lighting Fixtures:
  - a. Install in ballast channel of fixture with charging indicator light and test switch mounted on fixture end, or visible and accessible through lens.

**END OF SECTION**